ENFIELD INLAND WETLAND & WATERCOURSES AGENCY

TUESDAY, MARCH 16, 2010

REGULAR MEETING @ 7:00 PM

PUBLIC HEARING to follow (if applicable)

Council Chambers

ENFIELD TOWN HALL
820 ENFIELD STREET
ENFIELD, CT

INFORMATION PACKET

AMENDED AGENDA
MEETING OF THE
ENFIELD INLAND WETLANDS AND WATERCOURSES AGENCY
TUESDAY, March 16, 2010 – **7:00 pm**
REGULAR MEETING

RECEIVED
ENFIELD TOWN CLERK

2010 MAR 10 PM 1:28

SUZANNE F. OLECHNICKI
TOWN CLERK

*****Council Chambers*****

********* ENFIELD TOWN HALL *********
*** 820 ENFIELD STREET***
** ENFIELD, CT 06082 **

REGULAR MEETING

1. Call to Order
2. Roll Call
3. Pledge of Allegiance
4. Executive Session

(Matters regarding specific employees, pending litigation, acquisition of real estate and / or matters exempt from disclosure requirements)

5. Public Hearing
   a. **IW-534– Enfield Properties** – is requesting a permit to construct two office buildings and five residential apartment buildings 153 South Road and adjacent lots (Map 55, Lots 80, 93 & 99), within the regulated area. Submitted 12/15/09, received 12/15/09, PPE 12/29/09, MPHCD 2/23/10, **EMPHCD 3/16/10**.
   b. **IW-535 – T.P. Rentals, LLC** – is requesting an amendment to the Town of Enfield Inland Wetlands and Watercourses Map for the property located on the south side of Hazard Avenue, immediately east of 150 Hazard Avenue (Map 74, Lot 118). Submitted 1/19/10, received 02/02/10, PPE 02/16/10, MAD 4/8/10, **MPHCD 4/6/2010.**
6. Call to Order of Regular Meeting
7. Public Participation - Issues of concern not on the agenda
8. Correspondence
   a. Flame-Weeding for Invasive Shrub Control Workshop
   b. CAWS Vernal Pool Monitoring Program Handouts
   c. ACOE Section 404(f) Farming Exemption Criteria Clarification Handout
   d. US Army Corps of Engineers – Presentation to Municipal Inland Wetland Staff Members, February 26, 2010
   e. ACOE Category I Eligibility Determination Form
9. Commissioner's Correspondence
   a. Site Visit Updates
10. Approval of Minutes –January 19, 2010, February 2, 2010 & March 2, 2010

PUBLIC HEARING
IW 534 – Enfield Properties

820 Enfield Street, Enfield, CT 06082
Phone: (860) 253-6355 Fax: (860) 253-4729
www.enfield-ct.gov

Town of Enfield
Planning Department

Memo

To: Enfield Inland Wetlands and Watercourses Agency

From: Katie Bednaz, Assistant Town Planner/Wetlands Agent

CC:

Date: March 11, 2010

Re: **Agent Review for IW# 534 – South Road (2)**

The following are my review comments and observations regarding the Inland Wetland and Watercourses Application IW-534 for the Proposed Elderly Housing and Commercial Development. The full set of plans for the project were reviewed entitled "Proopsed Elderly Housing and Commercial Development, South Road, Enfield, CT, Inland Wetlands Permit Application", sheets: MA-1, LA-1, LA-2, LS-1 thru LS-4, GR-1, GR-2, UT-1, UT-2, PH-1, SD-1 thru SD-5, NT-1 and 1, dated 12/11/09, revised to 02/10/10. In addition the application package, Wetlands Assessment Report and Stormwater Management Report Supplement which are located in the application file were reviewed. **Comments submitted as part of my original review are in regular print while new information in response to the plans with the most recent revision date of 03/08/10 is in bold.**

1) The Inland Wetlands application number should be located on all plan sheets. **This comment has been addressed.**
2) Sheet LA-1 specifies signage stating "Snow Stockpiling Prohibited in This Area". It may be more appropriate to designate the snow stockpiling areas with signage, noting on the sign that snow is to only be stored in specified areas. This may reduce the number of signs required. **No changes have been made to the plans.**
3) The direct impacts to wetlands should be clearly shown on the plans with labels or a table that identifies the square footage of disturbance. **The impacts have been shown on sheet MA-1 as a list, not including wetland restoration, enhancement and creation areas. The list is acceptable, but it is recommended the applicant provide the square footage of all impacts as it is a reporting requirement for the DEP.**
4) The Landscaping Plan shows the wetland creation/restoration/enhancement area plantings.
    a. The overall Landscape Plan (LS-1 and LS-2) should have each mitigation area clearly labeled with its designation. **This comment has been addressed.**
    b. LS-4 lists the number and species of plants to be installed in each mitigation area. LS-1 through LS-3 should reflect how many of which plants should be installed in each location. Currently the plans only show "Low Shrub Mass with Perennial Wildflower Bed", etc. It is understood that the designation of these planting will be directed by the on-site wetland scientist to some extent. At a minimum, the number of woody vegetation to be installed in each location should be specified with generic type (i.e. trees, shrubs) of

vegetation. Exact species can be directed by the on-site wetland scientist. **This comment has been addressed.**

c. Wetland restoration/enhancement areas 'A and B' and wetland creation 'A' has a label "Sump inches deep". How many inches deep? **This comment has been addressed.**
d. Sheet LS-4 "General Planting Notes for Mitigation Areas" item 7. It is recommended that it be added that soil test results with recommended amendments will be supplied to the Town for review and approval prior to the start of the mitigation activities. **This comment has been addressed.**
e. Sheet LS-4 "Site Specific Implementation Notes for Mitigation Areas South Road Site, Enfield, CT" item 6. Recommend adding limitation for the percentage of area that subsoil shall be left exposed. **This comment has been addressed.**
f. A line runs through a species listed on Table 2. Is this line intentional? **This comment has been addressed.**

5) Sheet GR-1.
   a. A construction exit is shown at the sites access from Barrett Road. If this access is not to be used for construction access, why is a construction exit shown? **This comment has been addressed.**
   b. The existing treeline along the Barrett Road paper street is unclear. The treeline how it is shown indicates that the entire field area is wooded. **This comment has been addressed.**
   c. "Haybale Erosion Control (HBEC)" detail shows that catch basins are to be protected with haybales and "marafi" filter fabric. It is recommended that the "marafi" fabric be changed to a silt sack or equivalent. "Marafi"fabric can easily rip with weight and can clog causing water to back-up and is not recommended for this application. Also, if the sacks are used in the roadway where traffic may run over haybales, haybales are usually not required to control sediment. **This comment has been addressed.**
6) Sheet NT-1.
   a. It is recommended that the construction sequence specify that stumps may not be removed from a phase before a substantial portion of the previous phase is permanently stabilized. Trees may be cleared, leaving the stumps in place will reduce the potential for erosion on the portions of the site that are not active. **This comment has been addressed.**
7) Sheet 1.
   a. The wetland line type appears to be incorrect in a few locations. The "points" of the line appear to be facing the wrong direction in a few locations. **It appears that the wetland line type remains incorrect between WF-179 to WF-189.**
8) Sheet LS-4 discusses that monitoring of the mitigation areas will be conducted for three growing seasons following construction of these areas with reports to be supplied to the IWWA following each monitoring. It is recommended that the applicant provide the criteria for review by the IWWA that will be used to determine whether the areas have been successfully constructed. The yearly report should evaluate these criteria. **The plans now state "...The applicant shall provide the criteria for review by the IWWA that will be used to determine whether the areas have been successfully constructed. The yearly report should evaluate these criteria." As the criteria is not submitted to date, at a minimum, it is recommended that this information be supplied for review and approval before construction commences. This could be added as a condition of approval.**
9) It is recommended that the following be conditions of approval:

a. A performance surety bond in the appropriate form shall be posted for 125% of the cost estimated by the applicant and confirmed by the IWWA Agent for the wetland mitigation activities (creation, enhancement, replacement) as proposed in the approved plans. The bond may be released by the IWWA Agent after the report is received following the third complete growing season for each mitigation area, as approved and completed to the Agent's satisfaction. The bond may be held for a longer period of time until it is determined that the mitigation areas are not performing as designed. Release of the bond by any other agency, board or commission does not remove the permittee's obligations with regard to this permit condition.
b. In accordance with Section 18.2 of the Inland Wetlands and Watercourses Regulations most recently revised in February 2005 an independent inspector at a reasonable cost shall be hired by the Town and paid for by the applicant to conduct bi-weekly inspections for the Town of all erosion and sediment control measures and report their findings to the IWWA on a weekly basis. Inspections shall be conducted bi-weekly during active construction and every three weeks when construction is inactive and soils remain exposed. Inspections shall be completed after each rain event of greater than 0.5" as determined by NOAA nearest rainfall gauge. The content and presentation of the weekly reports shall be reviewed and approved by the IWWA Agent prior to the start of any construction activities. The independent inspector shall be contracted with prior to the start of work. Payment for approximate three months of inspection shall be forwarded to the Town by the applicant for future payment of services prior to the start of construction. Funds shall be replenished prior to the balance dropping below the estimate for one inspection. **This condition shall be modified as discussed at the 3/2/10 IWWA Hearing.**
c. A wetland scientist, hired by the applicant, shall be on-site daily during the construction of the wetland mitigation areas. A weekly report that details progress, issues, solutions and determinations shall be submitted to the IWWA for tracking of the mitigation area construction progress. *(Not part of condition. This condition is recommended because the manner in which the mitigation areas are designed require guidance from a wetland scientist to be constructed. Detailed evaluations of the groundwater elevations and soil conditions in these areas have not been conducted to date. This makes field determinations by a wetland scientist essential to the long term success of these areas.)*
d. A Conservation Restriction as shown on the approved plans shall be placed on the applicable properties prior to the issuance of the Certificate of Occupancies for each subject property. A copy of the draft or final deed for each parcel must be submitted to the Inland Wetlands and Watercourse Agent for review and approval. Conservation restriction markers shall be installed in accordance with Town requirements, by a licensed surveyor, at the applicant's expense. Easement markers will be provided by the Planning Department. Where no trees are present greater than 6" dbh, easement markers shall be placed on 4" x 4" wooden posts to demarcate the easement boundary. Markers shall be placed at a minimum of 40 feet apart.

10) It is recommended that the conservation area be expanded to include the wetland mitigation areas.
11) Has the applicant considered directing roof runoff to rain gardens? **This comment has <u>not</u> been addressed.**
12) The soil stockpile that currently exists on the site should be shown on the plans. It should also be specified what will happen to the soil pile during construction. **This comment has been addressed.**

13) The yard drain that is specified to be installed should be shown as it relates to the wetland boundary and identified in the field. It is a concern that the yard drain will drain the existing wetlands and should be closely evaluated. **The yard drain is shown within the tree line in an area on the plans that is not specified as wetlands. However, field investigations indicate that the area within the tree line is predominantly wet. No markers were installed in the field to indicate the exact location of the drain. This may be because the area where the drain is proposed to be installed is off of the project site.**

    It is strongly recommend that drains not be placed within wetlands as they may alter the wetland characteristics. I find it acceptable to install the drain within the maintained lawn, but not within the tree line. If installing the drain within the yard is not acceptable, then it is recommended that it be removed from the plans.

    In addition, it is recommended that a note be added to the plans that provides a provision for an maintenance easement to be established for the yard drain and associated piping if it is installed.
14) If a fence may be installed between the development and neighboring properties, it should be shown on the submitted plans. **The fence line has been shown, but the details have not yet been presented. The details of the fence shall first be presented as a portion of the fence line is located in the wetlands. It is recommended that the fence be installed to allow for wildlife migration and the materials used be suitable for installation in and near wetlands.**
15) Long-term maintenance for the porous pavement and pavers should be included on the plans. **This item has been addressed.**
16) A written narrative of the alternatives investigated should be supplied that references the alternative plans submitted to date. **This comment has been addressed.**
17) Water Quality Basin #1 is designed with a rip rap level spreader. Recommend considering "greening" this area by replacing the rip rap with the appropriate erosion control blanket or similar technology. **This comment has been addressed.**
18) Recommend that the plans specify that no vehicles or fluid filled materials (including sani-cans, hydraulic equipment, etc.) be stored within 50 feet of wetlands or watercourses. If possible, it is preferred that these materials be stored 100 feet or more away. **This comment has been addressed.**
19) Specify on the plans the location for any concrete washout from the project. Any concrete washout should be contained so that it does not seep into the soil. Concrete washout has a very basic pH and can be toxic to aquatic life and potentially groundwater supplies. Therefore, proper disposal of this material should be specified. **The location and details for construction has been specified on the plans.**

As always, please contact me with any questions or concerns.

Bednaz, Katie

From: Cabibbo, John
Sent: Wednesday, March 10, 2010 2:25 PM
To: Bednaz, Katie; Giner, Jose
Cc: 'Guy Hesketh, P.E.'; _PlanningDirector; 'David Ziaks P.E.'; 'Frank Troiano'; 'Roger'; Bord, Jeffrey
Subject: RE: IW534 South Rd Adult Housing / Commercial Review

Engineering Division has reviewed the revised phase 1 plan, revision dated March 8, 2010. As previously recommended, a construction entrance has been added at the proposed staging area and erosion controls (erosion control fabric) has been added at the proposed temporary swale.

1. As previously recommended, the gap in the silt fencing near the staging area should be closed.
2. The phase 1 plan is indicated as a 1"=60' scale but it appears to be a 1"=50' scale.

From: Cabibbo, John
Sent: Tuesday, March 02, 2010 9:53 AM
To: Bednaz, Katie
Cc: 'Guy Hesketh, P.E.'; _PlanningDirector; 'David Ziaks P.E.'; 'Frank Troiano'; 'Roger'; Giner, Jose; Bord, Jeffrey
Subject: RE: IW534 South Rd Adult Housing / Commercial Review

Engineering Division has reviewed the attached responses from the Applicant's Engineer. All of the previous engineering concerns have been addressed, other than the lighting plan. It is recommended that the phase 1 plan add a construction entrance at the proposed construction staging area, the gap in the silt fencing near the staging area be closed and some type of appropriate erosion control measures be added at the proposed temporary swale, to stay in place until ground cover is established.

From: Guy Hesketh, P.E. [mailto:ghesketh@fahesketh.com]
Sent: Friday, February 26, 2010 4:12 PM
To: Cabibbo, John
Cc: Bednaz, Katie; _PlanningDirector; 'David Ziaks P.E.'; 'Frank Troiano'; 'Roger'
Subject: South Road

John, here are written responses to your outstanding comments, as well as a more detailed phasing plan.

Let me know if you have any questions.

We will be delivering 10 copies of the materials in hard copies to Katie on Monday morning so she can distribute to IW Commissioners.

Thanks,

Guy A. Hesketh, P.E.
F. A. Hesketh & Associates, Inc.
3 Creamery Brook
East Granby, CT 06026

ph 860-653-8000
fx 860-844-8600
email: ghesketh@fahesketh.com

Bednaz, Katie

IW#534

From: David Ziaks P.E. [dziaks@fahesketh.com]
Sent: Tuesday, March 09, 2010 8:41 AM
To: Bednaz, Katie
Cc: Roger Kellman
Subject: South Road

Good Morning Katie,

I believe we have addressed all your comments on the revised plans. We also took care of John's.

We did not change the level spreader from riprap to some kind of erosion fabric because of our concerns with long term erosion right next to the wetland.

We believe the modified riprap gives us short and long term stability and durability. We will not put any fabric under the riprap which will allow vegetation to work its way up through the riprap pretty quickly and it will pretty much disappear over time anyway.

If you have any questions, please contact me or Roger Kellman.

Thanks,

Dave Ziaks, PE

Hesketh

F. A. Hesketh
& Associates, Inc.

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6 Creamery Brook
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email: dziaks@fahesketh.com

RECEIVED
MAR 2 2010
ENFIELD IWWA
AT THE HEARING

MEMORANDUM

To: Katie Bednaz **Date:** 2/26/10

From: Dave Ziaks, PE

Subject: **Alternatives Narrative**

Our File: **South Road---90071.00 IWC#534**

In response to your staff comments dated 2/24/10, this memo provides a written narrative for the alternatives analysis presented by the applicant at the 2/16/10 Public Hearing. While numerous alternatives have been considered by the applicant over the years including alternate uses and layouts for the property, three were selected for discussion based on underlying zoning requirements and the feasibility of alternative uses based on practical market conditions and similar resource impacts comparable to the project proposed under IWC #534.

Alternate "A" was a review of the previously proposed mixed use project that was approved by both the Enfield IWC and TPZ Commissions, but was never undertaken. The project as previously proposed had considerable more wetland impacts than the current proposed project, and therefore simply resubmitting the previous project for re-approval by the town was not deemed to be the a more feasible and prudent alternate to the current proposal.

Alternate "B" was a review of a mixed use project where the R-44 portion of the property was developed under current Zoning and Subdivision Regulations for single family homes. It was determined that at most, three lots could be developed, but would have resulted in similar wetland crossings for driveway access to the homes and similar impacts to wetland areas because of general development for reasonable rear yard areas for the individual homes. Therefore, it is the applicant's position that this development scheme is no more feasible or prudent than the current proposal.

Alternate "C" examined a mixed use plan that reduced the apartment development down to the first two units closest to South Road, thereby eliminating the crossings to the southerly portion of the site required for development of the remaining three buildings proposed. This size apartment project is not an economically feasible to the applicant and therefore is not a feasible and prudent alternate.

MEMORANDUM

In summary, having studied many alternate uses and layouts for the property over the past years, the applicant believes that the current proposal is the most feasible and prudent alternative use for the property. The actual driveway crossings and filling of the two small isolated wetland areas have been designed to minimize direct wetland impact to the extent possible, and there are no feasible or prudent alternative designs for the drive crossings or general fill areas as proposed.

d:project\90071/altmemo.doc

Hesketh

F. A. Hesketh
& Associates, Inc.

F. A. HESKETH & ASSOCIATES, INC.
6 Creamery Brook
East Granby, CT 06026
(860) 653-8000 (860) 844-8600(Fax)
email: mail@fahesketh.com

MEMORANDUM

To: John Cabibbo **Date**: February 26, 2010

From: Guy Hesketh

Subject: **South Road IW534**
Our File: **90071**

John, below our written responses to comments presented in your February 25, 2010 email to Katie Bednaz and Dave Ziaks and those referenced in your December 23, 2009 email to Jose Giner and Katie Bednaz. Your comments are in normal font, our reponses are in **Bold** font.

Comments:

A. In the review of the system design, a few discrepancies were found between the invert elevations shown in the stormwater report and those shown on the plans, more specifically catchbasins 10, 21 and 21 A.

These discrepancies have been addressed in the revised plans (02-10-2010) and Stormwater Report Supplement (02-10-2010) as recognized by you in your February 25, 2010 email.

B. The Town regulations call for a 50 year storm capacity for culverts under roads of which there are two proposed on the subject project. One is an 18" diameter CPE near building #2 and the other is a 15" RCP near building #4. Inverts are noted on the plans indicating pipe slope but capacity calculations were not found for these two culverts.

Capacity calculations for the 15-inch diameter culvert are attached. The contributory watershed area that drains to the 15-inch diameter culvert is depicted on Figure A (attached). By the Rational Method, the 1.21 acre contributory watershed would be anticipated to generate 6.5 cfs of flow to the culvert for the 50-year storm event. (See attached calculations.) The DOT nomograph shows a 15-inch diameter culvert has a full flow capacity of about 7 cfs. The culvert therefore, has adequate capacity to pass the 50-year storm.

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MEMORANDUM

The original plan submission depicted an 18-inch diameter culvert under the drive near Building#2. The revised plans (rev. 2-10-2010) replaced the 18-inch diameter culvert with an equivalent capacity twin 12-inch diameter culvert. These culverts drain the area up-gradient of the drive via an outlet structure. The hydraulic capacity of the outlet and twin 12-inch culverts was provided in the hydrologic analysis presented in the Stormwater Report Supplement (02-10-2010). A copy of the stage discharge curve is attached. To demonstrate the capacity of the twin culvert, a rational method analysis was conducted to determine the peak rate of flow to the culvert inlet then compared to the stage-discharge relationship of the Hydraflow model. The contributory watershed area is depicted on Figure B (attached). By the Rational Method, the 2.98 acre contributory watershed would be anticipated to generate 8.9 cfs of flow to the culverts. The stage discharge curve presented in the Hydraflow model in the Stormwater Report Supplement (02-10-2010) indicates the outlet structure and twin 12-inch diameter culverts will pass 9.0 cfs at an elevation of 128.45 at the inlet side of the culverts. The culverts therefore, have adequate capacity to pass the 50-year storm.

C. In addition, the 18" culvert is paired with a 3" diameter pipe. Engineering Division typically requires minimum 8" diameter pipes for carrying storm drainage. When exposed to debris (leaves, branches, grass), these pipes are easily clogged due to the small diameter.

The original plan submission depicted an 18-inch diameter culvert and a 3-inch diameter culvert under the drive near Building#2. The revised plans (rev. 2-10-2010) replaced the 18-inch diameter culvert with an equivalent capacity twin 12-inch diameter culvert with an inlet structure with a 3-inch diameter orifice inlet. The revised plans were erroneously labeled. An excerpt from the UT-1 (revised 2-10-2010) without the erroneous label is attached.

D. The narrative indicates that the existing culvert under the neighboring driveway, which is also the design outlet point, currently only has the capacity to carry between a 10 and 25 year storm event before topping the driveway. Though the proposed design analysis indicates a zero increase in peak runoff, as required, and design efforts are being proposed to enhance groundwater recharge and water quality, has the Applicant considered working with the neighbor in improving the capacity of this existing driveway culvert crossing?

As discussed in the IWC public hearing, the applicant has agreed to work with the owner of the existing culvert under the neighboring driveway to the west and is amenable to working with the neighbor and town staff on reasonable solutions to upgrading the culvert capacity.

E. There are Stormtech chambers proposed on the commercial portion of the subject parcel,

MEMORANDUM

intended for groundwater recharge, along with pervious block payers in sections of the parking. Have any test holes been dug to determine the possible effectiveness of these improvements in the proposed locations, as it relates the soil types and groundwater elevations?

The locations of the pervious block pavers are in areas where fill is required to attain finish grade. Fill materials in these areas will consist of at least two feet of permeable granular backfill and pervious base materials, allowing infiltration into the underlying fill soils and to some extent natural subsoils below. Observations made on the site by the Project Soil Scientist (see attached report) indicate that over much of the site relatively permeable soils are encountered in the uppermost soil horizon. Because these pervious block areas are all in areas of fill, groundwater levels are not a concern and groundwater levels will not restrict the infiltrative capacity of the pervious pavers. The infiltrated water would be anticipated to reach the upper permeable subsoils.

The Stormtech chambers provide two functions; 1) they provide for stormwater conveyance from the outlet of Water Quality Basin #9 (WQB #9) to the level spreader, and 2) they provide for potential groundwater recharge.

The flow line elevation of the outlet pipe from Water Quality Basin #9 [WQB #9] (elev. 123.95) and the ultimate outlet point of the Stormtech Chambers (elev. 123.4 at the rip rap level spreader) does not provide sufficient slope for installation of a standard culvert. By using the Stormtech units, a relatively wide, level conveyance corridor is provided between the outlet of WQB #9 and the rip rap level spreader, similar to a long, narrow subsurface detention pond. The Stormtech units will be constructed by excavating into the natural soils and placing them on a 6-inch thick layer of crushed stone. It is anticipated that during the wetter months of the year, the eastern portion of the system would be below what is currently the likely seasonal high groundwater level. It is likely that during the drier months, much of the eastern portion of the systems would be above the seasonal high groundwater levels. However, the western portions of the system would be constructed in areas not much below current ground surface elevations and the bottom of the Stormtech units in this area would be anticipated to be above the seasonal high groundwater levels. All in all, some infiltration into the subsoils would be anticipated.

F. A site lighting plan should be added to the plan set along with lighting details. Elderly housing and commercial developments should be well lit for safety purposes.

A detailed lighting plan with photometrics will be developed and submitted as part of the Planning and Zoning submittals.

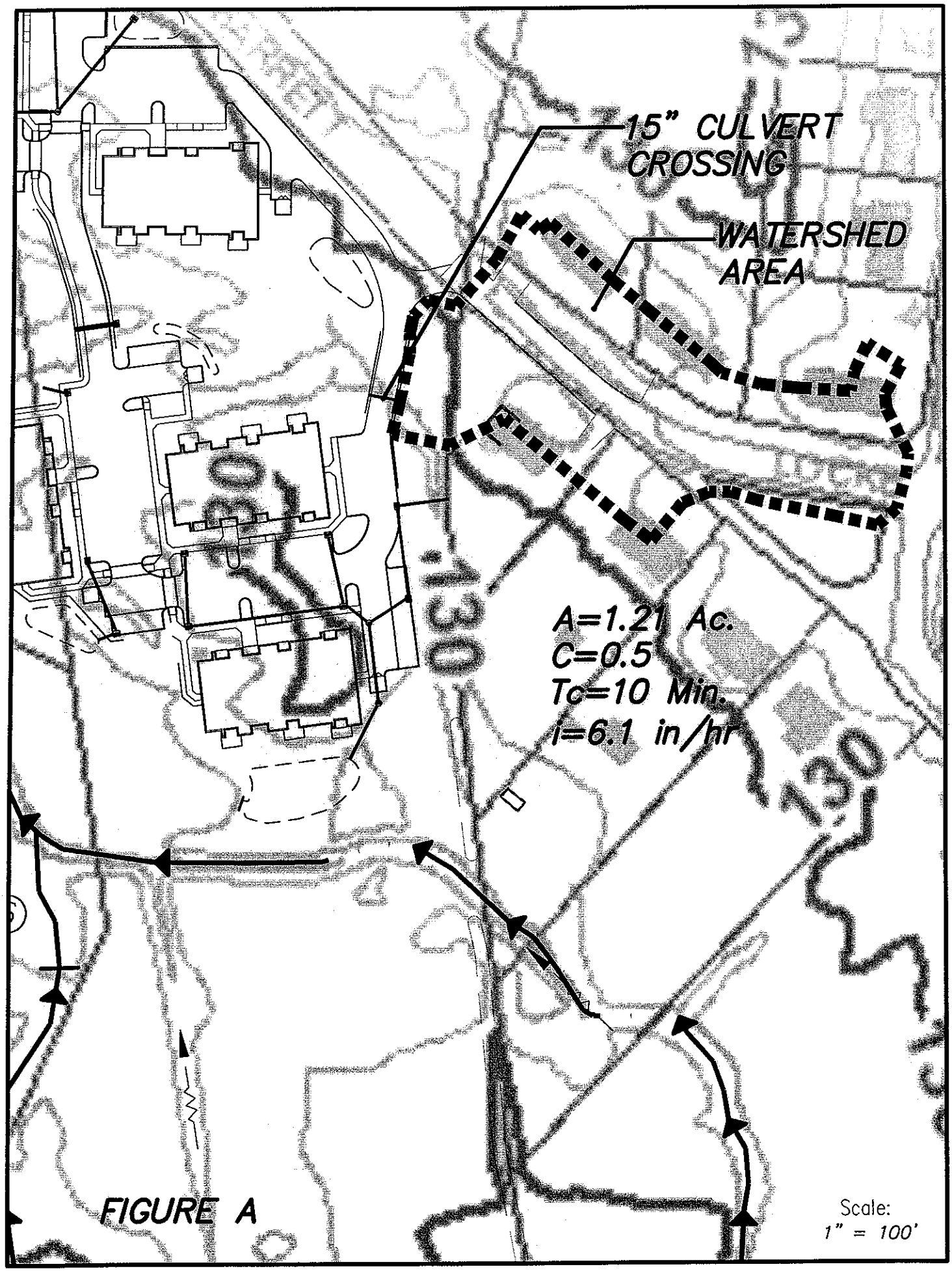
MEMORANDUM

G. With the newly-proposed phasing plan, a more detailed phased plan set should be submitted which will indicate how the drainage system will be installed through the proposed phase lines and how the erosion controls and grading will be installed as these phases could possibly stand alone for a significant time. Specific detail should be shown at the phase lines which cut through the proposed improvements and the roadway stubs.

A more detailed phase plan for Phase 1 has been generated and is attached as Sheet PH-2. The Phase 1 plan depicts the limits of Phase 1 construction superimposed over the overall construction plan. The proposed grading, erosion control measures, utilities, and storm drainage improvements for Phase 1 are depicted on this plan. During Phase 1, Water Quality Basin #9 (WQB #9) and associated storm drainage systems that drain into WQB #9 will be constructed. Both the main drive and emergency-access drive from south Road to the residential portion will be constructed. The area between WQB #9 and the future commercial building will be rough graded and runoff directed to the catch basins of the storm drain systems that discharges into WQB #9. Portions of the main drive will be promote sheet flow through the future parking areas to the basins.

The Stormtech system draining WQB#9 will be constructed from the basin outlet to the main driveway to South Road. From here, a 24-inch storm drain will be installed from the manhole to the area west of the main drive. This 24-inch pipe will discharge to a temporary swale created west of the drive to the proposed future outlet area and rip rap level spreader. This will allow continuation of the Stormtech systems during Phase 3 construction without a need to disturb the balance of the stormwater discharge system.

Since multiple stormwater management systems are proposed in the residential portion, phasing of the residentail portion is relatively easy. Only residential improvements within the drainage areas of WQB #4, WQB#6, WQB#7 and WQB#8 are proposed in Phase 1. The balance of the residential section will be developed in subsequent phases, at which time the additional stormwater management systems and utilities will be installed.


15" CULVERT CROSSING
WATERSHED AREA
A=1.21 Ac.
C=0.5
Tc=10 Min.
i=6.1 in/hr
FIGURE A
Scale:
1" = 100'

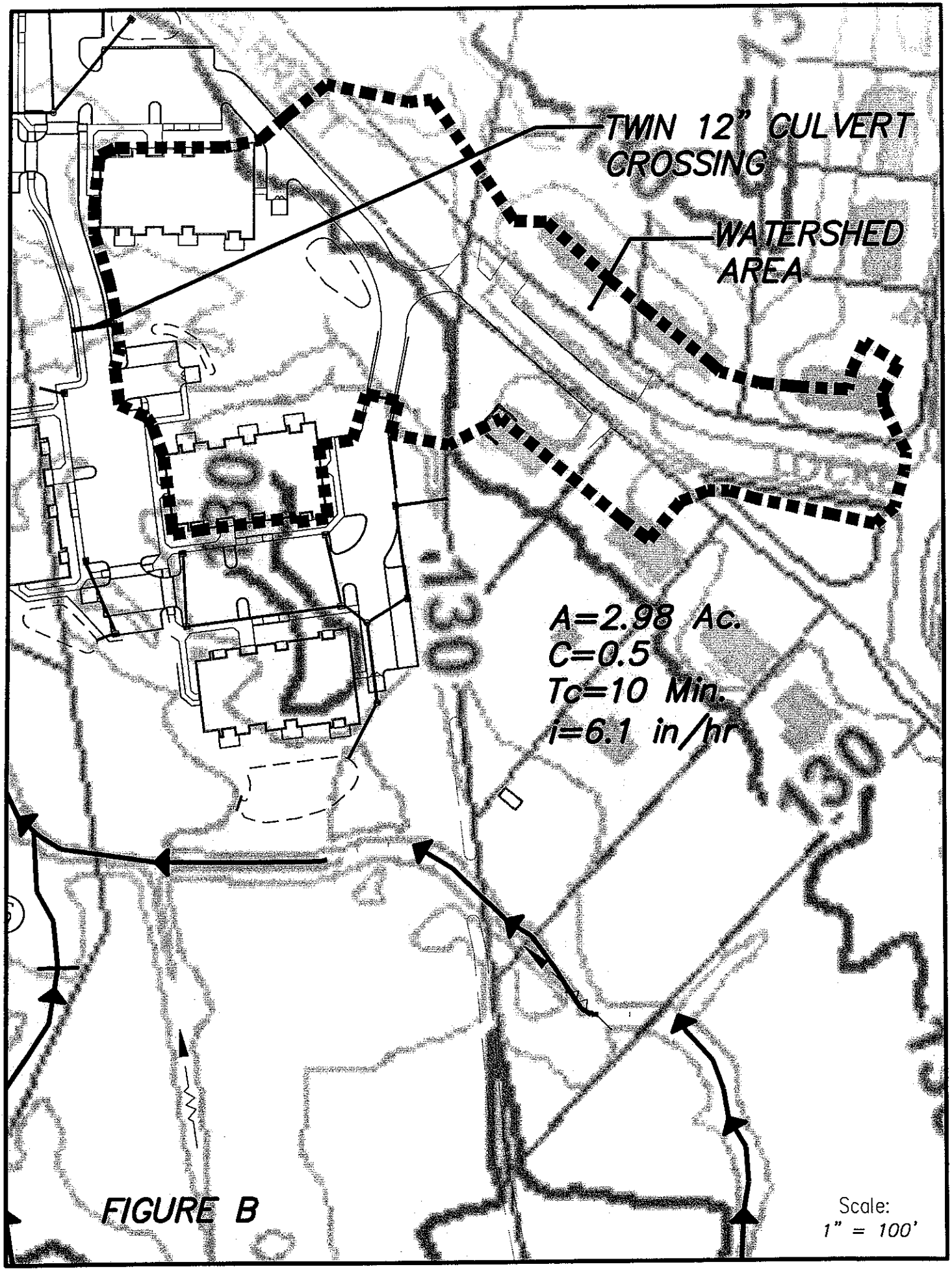

TWIN 12" CULVERT CROSSING
WATERSHED AREA
A=2.98 Ac.
C=0.5
Tc=10 Min.
i=6.1 in/hr
Scale:
1" = 100'

FIGURE B

F. A. Hesketh & Associates, Inc.
6 Creamery Brook
East Granby, CT 06026
Civil & Traffic Engineers • Surveyors • Planners • Landscape Architects

JOB ENFIELD SOUTH ROAD
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____

15" CULVERT CROSSING

CIRCL DESIGN CAPACITY - 50 yr STORM.

BY RATIONAL METHOD:

$Q = CiA$

$C = 0.50$
$A = 1.21$ Ac
$TC = 10$ min
$i = 152$ mm/Hr = 6.0 in/Hr.

$Q = 0.5\ (6.0)(1.21) = 3.63$ cfs.

CAPACITY OF 15" CULVERT (N-12) = 6.5 cfs.
@ 1.0 % BY NOMOGRAM

TWIN 12" CULVERT CROSSING.

CIRCL CAPACITY FOR 50-yr STORM

BY RATIONAL METHOD = $Q = CiA$

$C = 0.50$
$A = 2.98$ Ac.
$TC = 10$ min
$i = 6.0$ in/Hr.

$Q = 0.5(6.0)(2.98) = 8.9$ cfs

CAPACITY OF TWIN 12" CULVERTS (N-12) AT CROSSING.

FROM HYDRAFLOW ANALYSIS - PUMP REPORT. (SEE ATTACHED)

@ 9.0 cfs PASSES THROUGH AT ELEV. 128.95±

F. A. HESKETH & ASSOCIATES, INC.
Consulting Engineers - Surveyors
101 Millbrook Common
BLOOMFIELD, CT. 06002

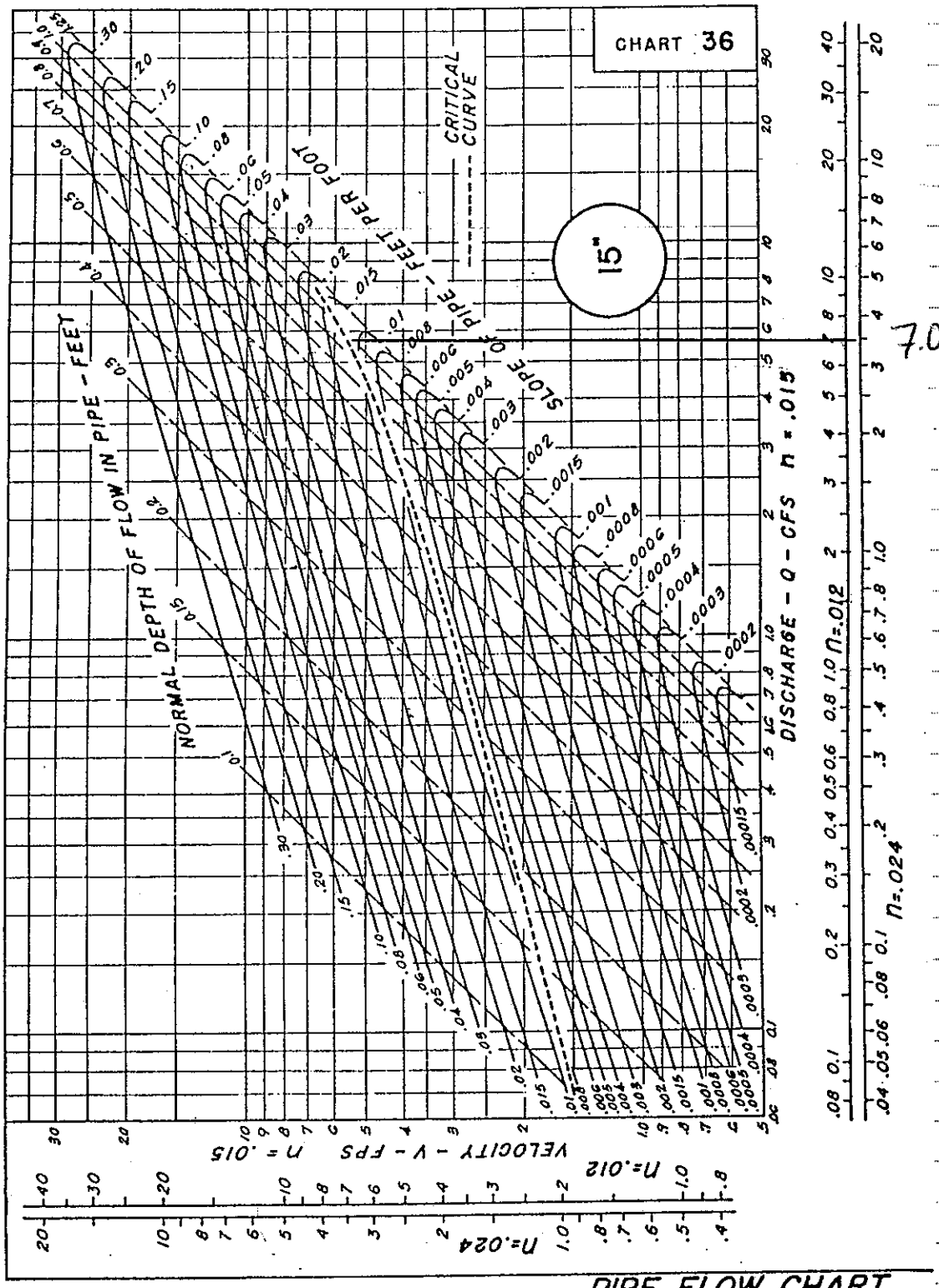
JOB _____

SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

SCALE _____



7.0 CS

PIPE FLOW CHART
15-INCH DIAMETER

Pond Report

Hydraflow Hydrographs by Intelisolve v9.1 — Thursday, Feb 25, 2010

Pond No. 6 - Pond 5/6

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 126.30 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	126.30	10	0	0
0.70	127.00	1,000	259	259
1.20	127.50	9,245	2,214	2,473
1.70	128.00	15,135	6,034	8,507
2.70	129.00	25,368	20,031	28,538

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	4.00	0.00	0.00
Span (in)	= 12.00	4.00	0.00	0.00
No. Barrels	= 2	1	0	0
Invert El. (ft)	= 126.04	126.30	0.00	0.00
Length (ft)	= 34.00	0.50	0.00	0.00
Slope (%)	= 0.01	0.01	0.00	n/a
N-Value	= .012	.012	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

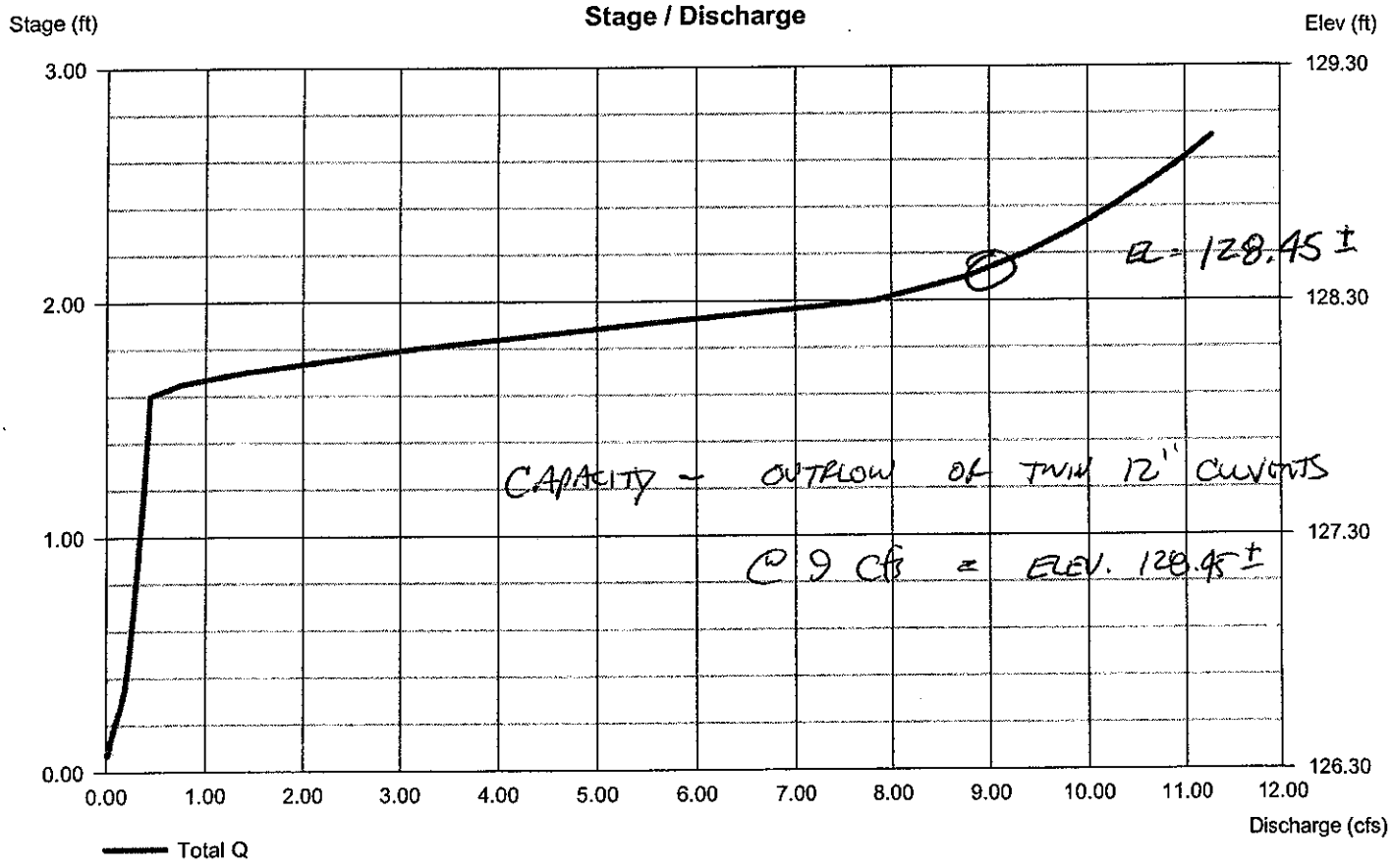
Weir Structures

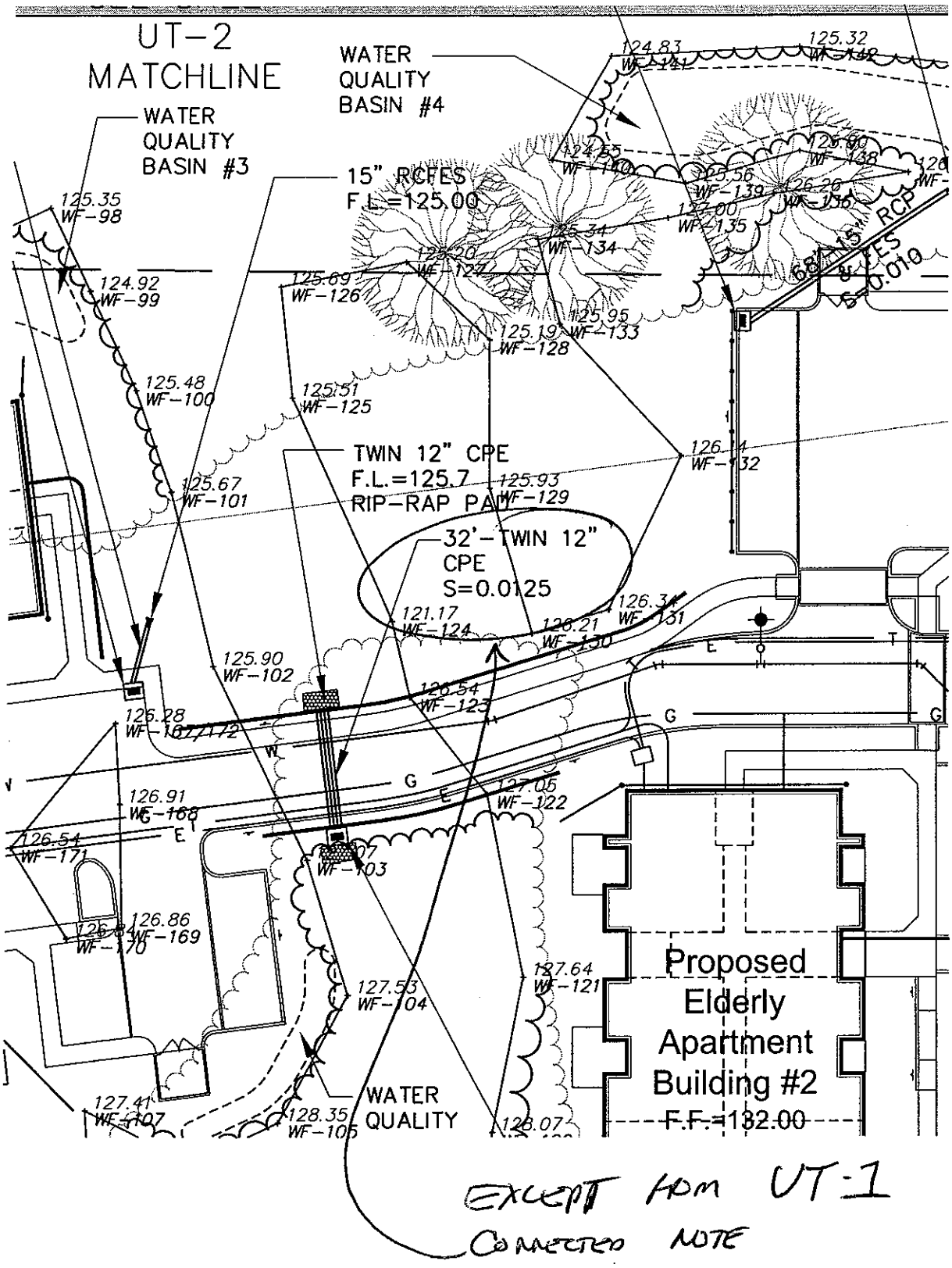
	[A]	[B]	[C]	[D]
Crest Len (ft)	= 9.22	Inactive	0.00	0.00
Crest El. (ft)	= 127.90	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Riser	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).




UT-2
MATCHLINE
WATER
QUALITY
BASIN #4
WATER
QUALITY
BASIN #3
15" RCPES
F.L.=125.00
TWIN 12" CPE
F.L.=125.7
RIP-RAP PAD
32'-TWIN 12"
CPE
S=0.0125
15" RCP
WATER
QUALITY
Proposed
Elderly
Apartment
Building #2
F.F.=132.00
EXCEPT FROM UT-1
CONNECTED NOTE

SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC.

545 Highland Avenue * Route 10 * Cheshire * Connecticut * 06410 * (203) 272-7837
FAX (203) 272-6698

WETLANDS/WATERCOURSES AND SOIL REPORT

To: F.A. Hesketh & Associates
6 Creamery Brook
East Granby, CT 06026

SSES Job No: 2009-36-CT-ENF-1
Client Job No: _____
Site Inspection Date: March 17 to 20, 2009

PROJECT TITLE AND LOCATION: Lots 80 & 93, South and Barrett Roads, Enfield, CT

IDENTIFICATION OF WETLANDS AND WATERCOURSES RESOURCES

WETLANDS AND WATERCOURSES PRESENT ON PROPERTY: Yes XX No _____

Wetlands: Inland Wetlands XX **Watercourses:** Streams XX

Tidal Wetlands _____ Waterbodies _____

Remarks: _____

VEGETATION COMMUNITIES PRESENT IN WETLANDS

Forest XX Sapling/Shrub XX Wet Meadow XX Marsh _____ Field/Lawn XX

SOIL MOISTURE CONDITION

Dry _____
Moist XX
Wet XX

WINTER CONDITIONS

Frost Depth: none inches
Snow Depth: none inches

The classification system of the National Cooperative Soil Survey, USDA, Natural Resources Conservation Service and the State Soil Legend were used in this investigation. The investigation was conducted by the undersigned Registered Soil Scientist. A sketch map showing wetland boundaries and the numbering sequence of wetland markers, watercourses and soil types in both wetland and non-wetlands are included with this report. After the wetland boundary and/or watercourse flags have been located/plotted by the surveyor, it is recommended that a copy of the survey map be sent to our firm for review. All wetland boundary lines established by the undersigned Registered Soil Scientist are subject to change until officially adopted by local, state or federal regulatory agencies.

Respectfully Submitted by

SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC.

Thomas W. Pietras

Thomas W. Pietras
Registered Professional Soil Scientist
Professional Wetland Scientist

See attached pages

SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC.
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FAX (203) 272-6698

WETLANDS/WATERCOURSES AND SOIL REPORT

PROJECT TITLE AND LOCATION: Lots 80 and 93, South and Barrett Roads, Enfield, CT

NUMBERING SEQUENCE OF WETLAND BOUNDARY LINE MARKERS:

1 THRU 41 1/42 THRU 75 76 THRU 166 167 THRU 172 173 THRU 178 179 THRU 189

190 THRU 201 202 THRU 205 206 THRU 214

SOILS SECTION:

Soil Legend: State Soil Number/County Soil Symbol, Soil Series Name, Taxonomic Class & Brief Description.

WETLAND SOILS

Aq Aquents - This is a poorly to very poorly drained, disturbed soil where two or more feet of the original soil surface has been altered by filling, excavation and/or grading. Aquents are characterized by a seasonal to prolonged high groundwater table at or near the ground surface. Aquents are capable of supporting a prevalence of hydrophytic plants.

9 Scitico, Shaker and Maybid soils (Epiaquepts & Humaquepts) – These are deep, poorly drained and very poorly drained soils formed in a loamy or silty solum overlying silty-clay glacial lacustrine (relic glacial lakebed) deposits. Typically, depths to clayed materials is 20 to 40 inches. These soils were formerly mapped in Connecticut as the Scantic, Swanton and Biddeford.

13 Walpole very fine sandy loam (Aeric Endoaquepts)- This is a deep, poorly drained, friable, coarse-loamy textured soil developed over sandy and gravelly outwash or water-sorted materials. Walpole soils occur in valleys, outwash plains and terraces.

NON-WETLAND SOILS

21 Ninigret and Tisbury soils (Aquic Dystrudepts) – These are deep, moderately well drained, friable, coarse-loamy and loamy textured soils developed over sandy and gravelly outwash or water-sorted materials derived from schist, gneiss and granite. Ninigret and Tisbury soils occur in valleys, outwash plains and terraces.

308 Udorthents, smoothed This is a well drained to moderately well drained, disturbed soil area that has had two or more feet of the original soil altered by filling, excavation and/or grading activities. Udorthents soils commonly occur on leveled land and on fill landforms.

Notes: The property consists of old farmland. Up until recently the land was still utilized for agriculture. Corn stubble is still present in several fields. Soils in the fields have been altered by land clearing, filling, excavation, land-leveling and deep plowing. Land-leveling activities included removal of the soil materials from higher ground and deposition of fill into the lower landscape. As a result many of the original poorly drained wetland soils are presently characterized by over 20 inches of topsoil. On the higher ground the original A and some or all of the B horizons were removed from many of the moderately well drained and well drained soils. The original upland soils now have truncated soil profiles where plowed topsoil now overlies either a lower B horizon

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WETLANDS/WATERCOURSES AND SOIL REPORT

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190 THRU 201 202 THRU 205 206 THRU 214

SOILS SECTION:

Soil Legend: State Soil Number/County Soil Symbol, Soil Series Name, Taxonomic Class & Brief Description.

Soil Report (continued)

or a C horizon. In some areas the removal of the upper soil profiles from original moderately well drained soils has resulted in a seasonal high groundwater table at or very near the soil surface, and these areas were mapped as wetlands. Ditches were cut within and between the fields for purposes of channelizing streamflow, removing surface water from fields and partially draining the soils. The wetlands in the abandoned fields primarily support wet meadow communities, that include: soft rush, purple loosestrife, aster, sedges, meadowsweet, Joe-Pye weed, seedbox and willow herb. The upland soils in the abandoned fields contain a mix of herbaceous plants commonly found on moist to dry soils in old fields, including: ragweed, field grasses, goldenrods, campion, Queen Anne's lace, black-eyed Susan and evening primrose.

SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC.
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DEFINITIONS AND METHODOLOGY
DEFINITIONS OF STATE REGULATED WETLANDS & WATERCOURSES

INLAND WETLANDS AND WATERCOURSES: According to Section 22a-38 of the State of Connecticut Inland Wetlands and Watercourses Act, Wetlands "means land, including submerged land, not regulated pursuant to sections 22a-28 to 22a-35, which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial, and floodplain by the National Cooperative Soils Survey, as may be amended from time to time, of the Natural Resources Conservation Service (NRCS) of the United States Department of Agriculture." Watercourses "means rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs and all other bodies of water, natural or artificial, vernal or intermittent, public or private. Intermittent watercourses shall be delineated by a defined permanent channel and bank and the occurrence of two or more of the following characteristics: (A) Evidence of scour or deposits of recent alluvium or detritus, (B) the presence of standing or flowing water for a duration longer than a particular storm incident, and (C) the presence of hydrophytic vegetation."

TIDAL WETLANDS: According to Connecticut General Statutes, Sec. 22a-29 (2) of the Tidal Wetlands Act, Tidal Wetlands are defined as "those areas which border on or lie beneath tidal waters, such as, but not limited to banks, bogs, salt marsh, swamps, meadows, flats, or other low lands subject to tidal action, including those areas now or formerly connected to tidal waters, and whose surface is at or below an elevation of one foot above local extreme high water; and upon which may grow or be capable of growing some, but not necessarily all of the following:" (list of those plants common to tidal marshes, brackish wetlands and other wetlands which are subject to tidal influence).

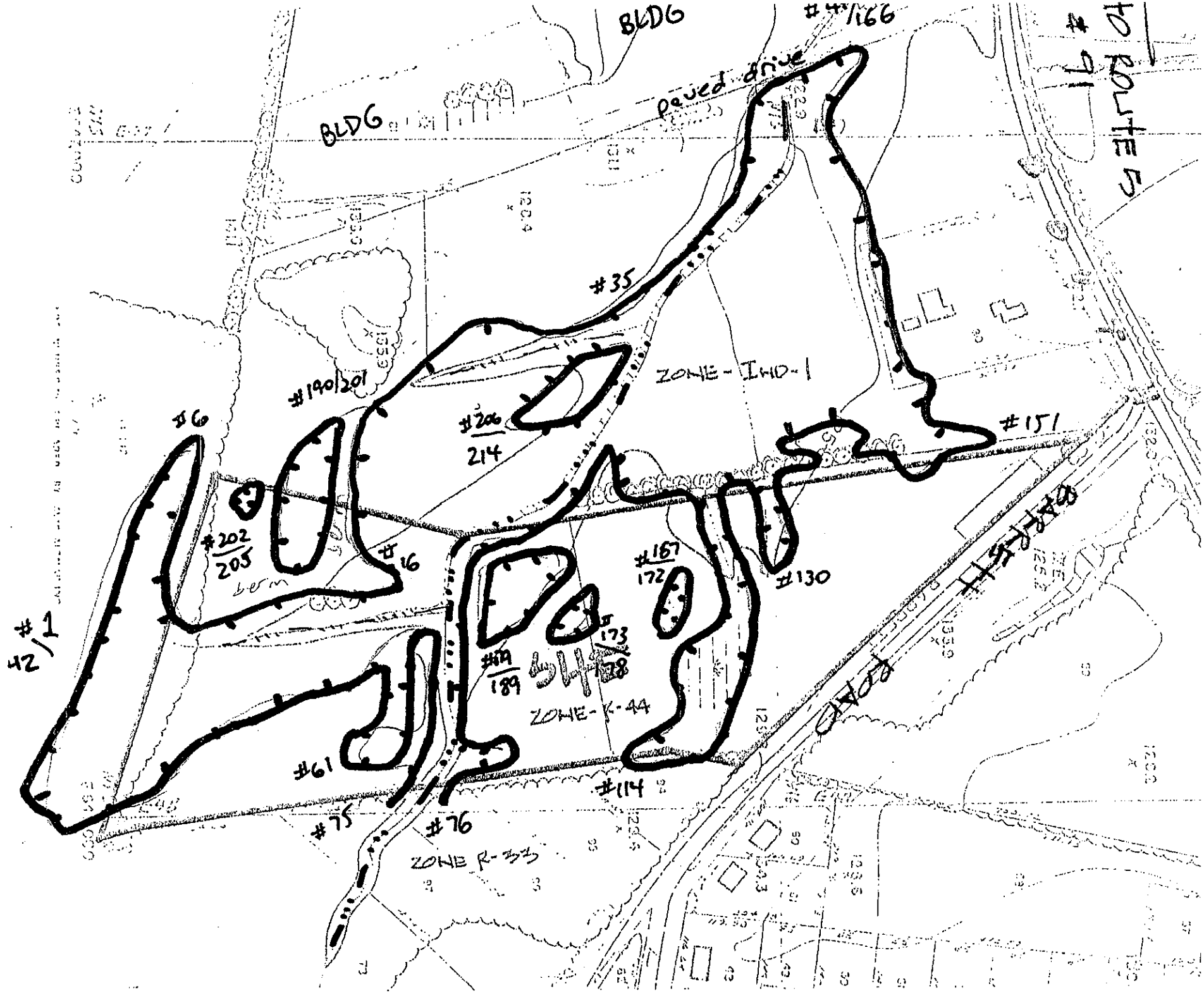
METHODOLOGY FOR IDENTIFICATION OF SOILS, WETLANDS & WATERCOURSES

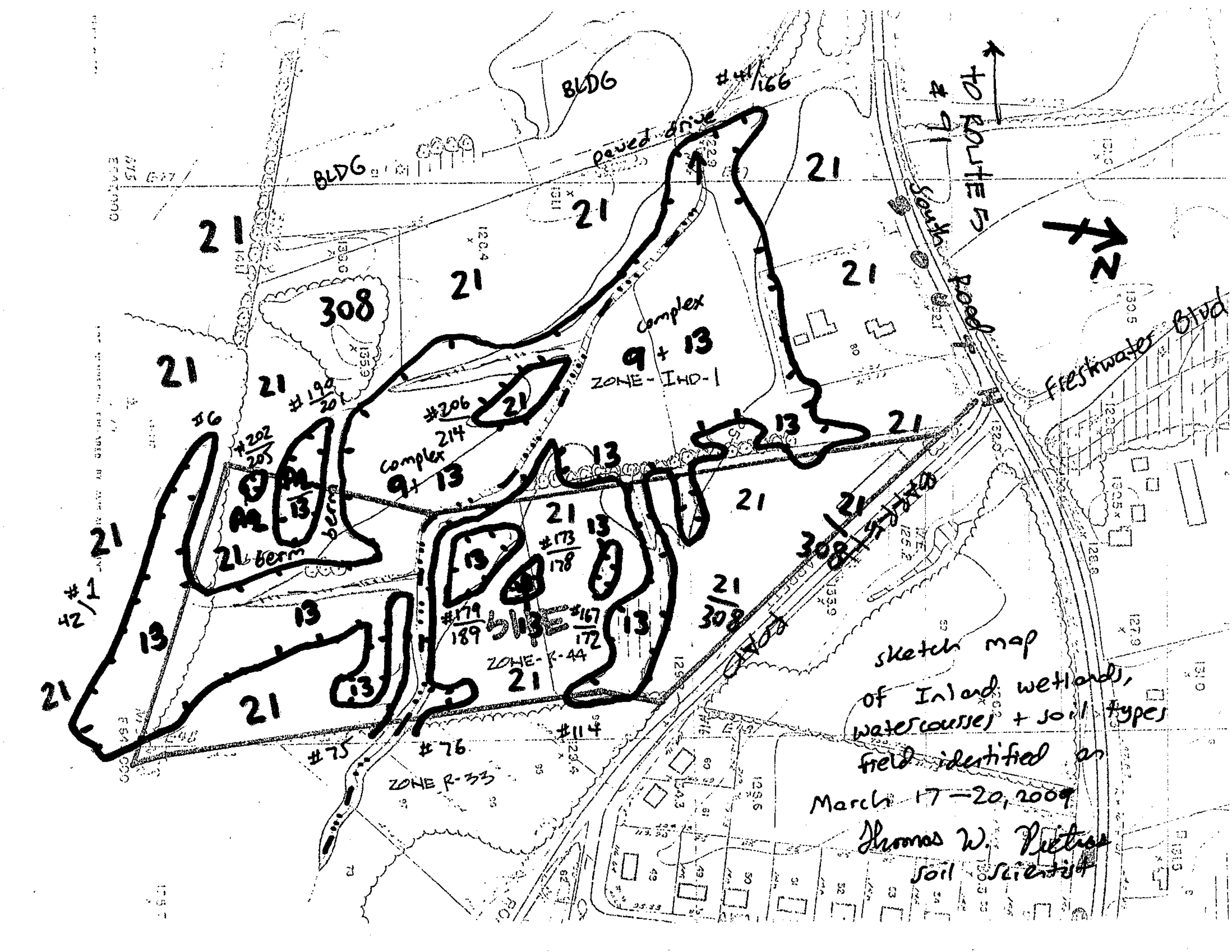
1) **SOILS IDENTIFICATION**: Soils are investigated by digging test holes with a spade and auger. Test holes are typically dug to depths of between 15 and 40 inches. Based on soil features, including coloration patterns, texture and depths to restrictive layers, the soils are identified by soil series utilizing the classification system of the National Cooperative Soil Survey. The soil map series correspond with the State Soil Map Legend established by USDA, NRCS in the State of Connecticut Soil Survey. For further information about soils refer to the NRCS website for CT: www.ct.nrcs.usda.gov

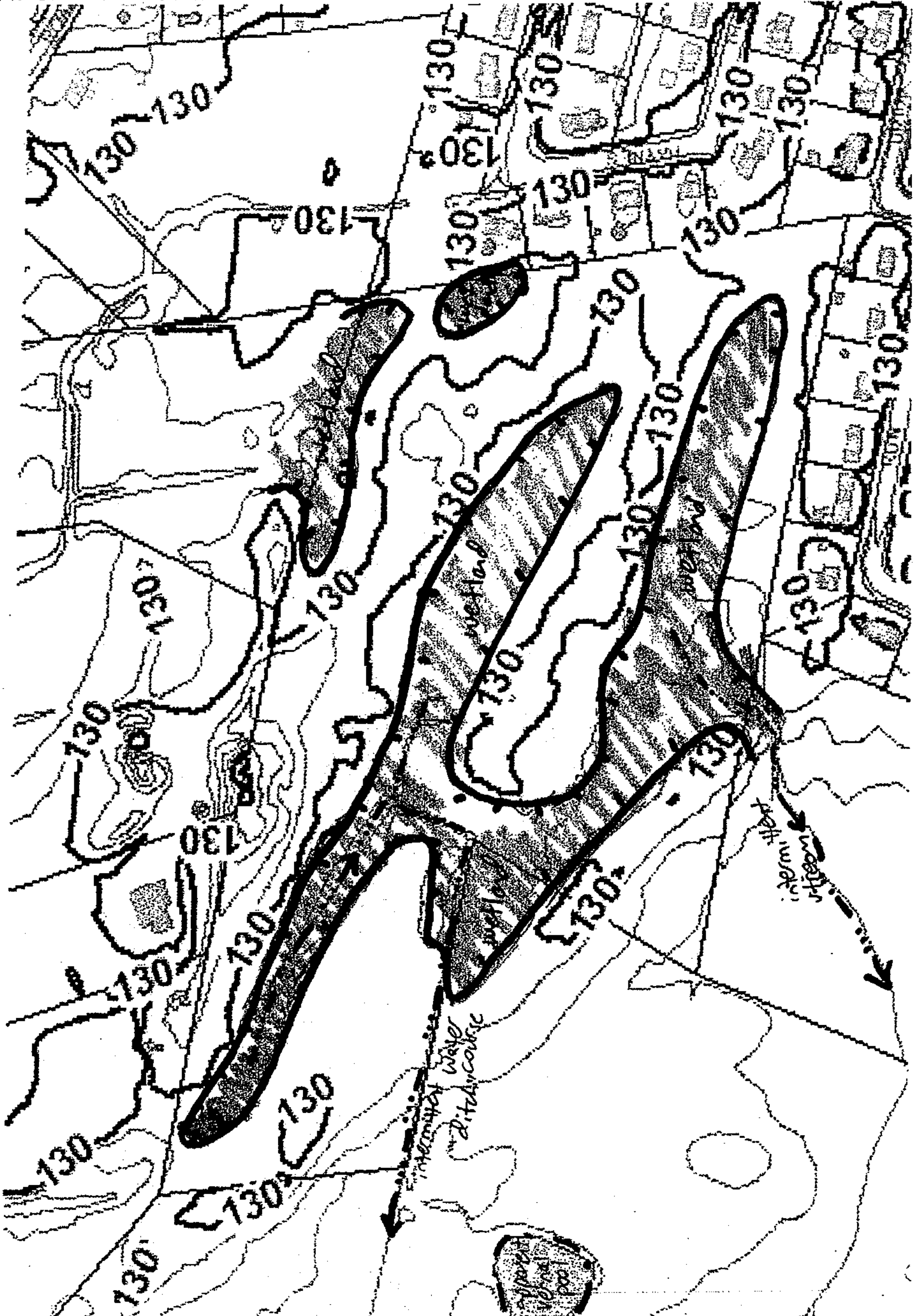
2) **INLAND WETLAND DELINEATION**: Soil test holes and borings are made in selected areas in order to determine the lateral extent of Inland Wetlands. The boundaries of all Inland Wetlands on each project site are delineated with consecutively numbered survey tapes, unless instructed by the client to only map wetland boundaries for planning purposes.

3) **IDENTIFICATION OF WATERCOURSES**: Watercourse locations are sketched onto maps. Often ponds, streams and rivers are already shown on the survey map. If a watercourse is not shown on a survey map, survey tapes are placed along the channel and labeled "Intermittent or Perennial Watercourse."

4) **TIDAL WETLANDS**: Tidal Wetlands are identified based on a predominance of tidal wetland plants and observation of physical markings or water laid deposits resulting from tidal action. Tidal Wetland boundaries are established by locating the upland limits of the "Listed Plants" from the Tidal Wetlands Act to the extent that these plants reflect inundation by tides.


BLDG
BLDG
#166
paved drive
TO ROUTE 5
#71
#35
#190/201
#206
214
ZONE - IND-1
#6
#151
#202
205
berm
#16
#167
172
#130
#1
42
#189
189
#173
128
ZONE - K-44
#61
#114
#75
#76
ZONE R-22.5


sketch map
of Inland wetlands,
watercourses + soil types
field identified as
March 17–20, 2009
Thomas W. Pietras
soil scientist
to ROUTE 5
#91
South Road
Freshwater Blvd
BARRETT ROAD
N
BLDG
paved drive
#41/166
complex
9 + 13
ZONE - IHD-1
#206/214
#190/201
#202/205
#6
berm
#173/178
#179/189
#167/172
ZONE - K-44
#114
#75
#76
ZONE R-33
#1/42
21
13
308
21/308


130

PUBLIC HEARING
IW 535 – T.P. Rentals, LLC

Certified Mail: XXXXXXXXXXXXX

WETLANDS MAP AMENDMENT APPROVAL #IW-535

March 17, 2010

Attn: Tim Ploszaj
T.P. Rentals, Inc.
PO Box 966
Simsbury, CT 06070

Dear Mr. Ploszaj,

At a regular meeting held March 16, 2010, the Enfield Inland Wetlands and Watercourses Agency took the following action:

IW-535 – T.P. Rentals, LLC – is requesting an amendment to the Town of Enfield Inland Wetlands and Watercourses Map for the property located on the south side of Hazard Avenue, immediately east of 150 Hazard Avenue (Map 74, Lot 118). **Approved.** This applications is approved in accordance with the plan entitled "Wetland Line Amendment Plan, property of T.P. Rentals, LLC, Hazard Avenue, Enfield, CT" dated December 14, 2009.

This amendment shall not become effective until a copy of the wetland boundaries as shown on the plan entitled "Wetland Line Amendment Plan, property of T.P. Rentals, LLC, Hazard Avenue, Enfield, CT" dated December 14, 2009 are recorded with the Town Clerk. Upon recording such plan evidence of such shall be submitted to the Planning Department for inclusion in the IW-535 file.

Please note that the hydrology of this site over time may change in response to changes in surrounding land uses or changes in site conditions. These changes may alter the wetlands boundaries as shown on the above referenced plans and may then be subject to additional review.

This authorization constitutes the permit required by Section 22a-39 of the Connecticut General Statutes. The decision legal notice will be published in the Journal Inquirer on **XXXXXXXXXXXXX, 2010**. Please note that the appeal period (15 days) begins as of the date of publication in accordance with Section 8-8 of the State Statutes.

If you have any questions, please feel free to contact me at 253-6358. Office hours are 9:00 AM to 5:00 PM, Monday through Friday. Voice mail is available after business hours.

Sincerely,

Katie A. Bednaz
Assistant Town Planner/Wetlands Agent

cc: File IW#535

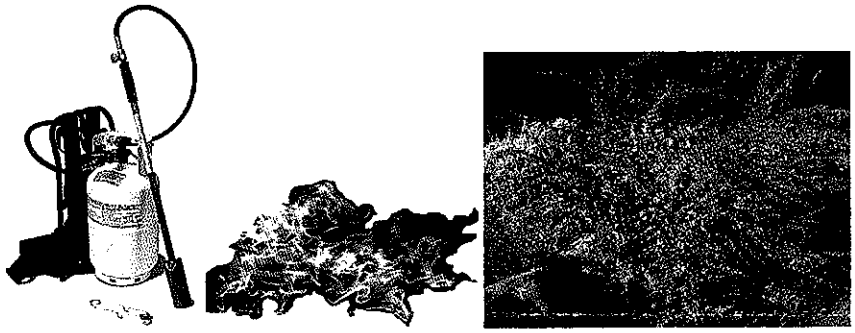
DRAFT

CORRESPONDENCE

Correspondence

The Connecticut Agricultural Experiment Station
The North Central Conservation District and
USDA Natural Resources Conservation Service Present:

Flame-Weeding for Invasive Shrub Control Workshop



Flame-weeding uses a controlled flame to heat the base of shrubs so that the sap boils and the plant subsequently dies. In this workshop, you will learn techniques for site evaluation, time estimations for treatments, and field safety.

Following lunch (bring your own), there will be a hands-on demonstration of the equipment and a short field trip to the CT DEP Belding Wildlife Management Area, where flame-weeding has been integrated into a program of invasive plant control.

Instructors: Jeffrey Ward and J.P. Barsky, *Connecticut Agricultural Experiment Station*
Jane Seymour, *Connecticut Department of Environmental Protection*

Date: Tuesday March 30, 2010
Place: Tolland County Agricultural Center
24 Hyde Avenue, Vernon CT 06066
Time: 10:00am – 3:00pm
Details: Bring lunch, dress for afternoon outside

Workshop is Free
Pre-Registration Required
Space is Limited, Register Early

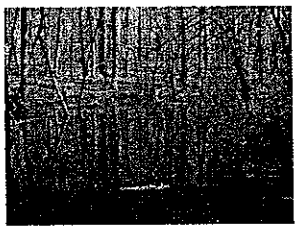
Contact the North Central Conservation District to Pre-register or for more information
(860) 875-3881

North Central Conservation District, Inc.

NRCS Natural Resources Conservation Service

Correspondence

CAWS Vernal Pool Monitoring Program



What is CAWS?
The Connecticut Association of Wetland Scientists is an organization of wetland professionals, land use commissioners and their staff involved with wetland regulation and conservation, formed in 1997 to advance the understanding of wetland science in Connecticut.

How long has the vernal pool monitoring program been around?
It's brand new— we are actively spreading the word about the program to Conservation and Wetland Commissions and other stakeholders.

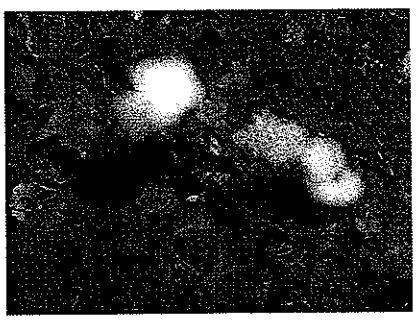
Why are you starting up this program?
Many of our members spend a great deal of time collecting baseline data on vernal pools as part of wetland permit applications. We make design recommendations to limit impacts to pool-breeding amphibians, and develop hypotheses about what those impacts will be. Yet we rarely have the opportunity to check the accuracy of our predictions after a site has been developed. The goal of this program is to improve our understanding of how pool-breeding amphibians respond to varying degrees of nearby development so that we can provide better informed design input in the future.

What do you mean by the term "vernal pool"?
A DEP Task Force developed the following vernal pool draft definition:

> "Vernal pool means a seasonal watercourse in a defined depression or basin, that lacks a fish population and supports or is capable of supporting breeding and development of amphibian or invertebrate species recognized as obligate to such watercourses. These species include spotted salamander, Jefferson salamander complex, marbled salamander, wood frog, and fairy shrimp."

So if a wetland contains wood frog or spotted salamander egg masses, does that make it a vernal pool?
Not necessarily. Breeding implies mating and egg-laying. Development means that in most years metamorphosis is completed (from egg to larvae to juvenile) before the pool dries up. Some amphibians deposit eggs in shallow ruts and other small depressions that dry up long before metamorphosis (or in some cases, even egg hatching) can be completed. These are not considered vernal pools because amphibian development is not completed.

A large group of wood frog egg masses



Spotted salamander egg masses

Can some very wet, large swamps serve as vernal pools?
Yes – vernal pools are not limited to small basin depressions. Some large wooded and shrub swamps produce great numbers of amphibian juveniles annually. Provided that they are inundated long enough to support the breeding and development of at least one of the six "obligate" species listed above, they are considered vernal pools for the purposes of this program.

How will the monitoring program work? What role will land use commissions play?
A critical role! We are asking Conservation and Inland Wetland/Watercourse Commissions (IWWCs) to identify applications that contain a verified or potential vernal pool. They will then request that the applicant include the pool(s) in Open Space or Conservation Easements and allow long-term monitoring of the pool(s) by CAWS volunteers. If the pool is accepted into the monitoring program, the IWWC will be asked to provide project maps and plans to CAWS.

Can an IWWC force an applicant to participate in the program through a condition of approval?
Absolutely not. The applicant's cooperation cannot be forced or coerced - it must be completely voluntary. Furthermore, an IWWC may not penalize an applicant in any way if he chooses to not participate in the program. For legal purposes, an applicant's participation in the program must be entirely voluntary.

How much will the monitoring cost the applicant?
Nothing. All monitoring will be done by CAWS members on a pro bono basis.

If a commission receives an application during the summer, fall or winter, how can they know if it contains a vernal pool?
Spring is the best season to identify vernal pools, when amphibian egg masses are easily visible. However, wood frog and spotted salamander larvae remain in the pools through mid-summer, and metamorphosed juveniles linger near the pools for some time after emerging from the water. A qualified professional can identify a vernal pool based upon the presence of these biological indicators. Of course, vernal pools can't be confirmed when dry or frozen. Still, one should look for clues (gray water-stained leaves on the ground, water marks on tree trunks, woody vegetation on raised hummocks, a basin depression landscape position) that suggest a wetland may be a vernal pool.

If a commission suspects that an application includes a vernal pool, but does not have definitive evidence, would CAWS consider including it in the monitoring program?
Yes. Given strong evidence, we will consider including it in the program and determine whether it is a vernal pool through spring-time monitoring.

Can a vernal pool be included in the program if it is not possible to collect baseline data before development occurs near it?
No. We are interested in comparing baseline (pre-development) and post-development vernal pool productivity. Thus, we have to be able to inspect the pool before land development is started near it.

Can data collected by an applicant's wetland scientist serve as baseline data for the monitoring program?
Yes, provided that these data collection methods comply with the protocol that we have developed for the monitoring program.

What data will be collected in the program?
We will inspect the pools twice each spring: first in late March or early April to search for and count wood frog egg masses, then about three weeks later we will do the same for spotted salamander egg masses. Additionally, we may search for fairy shrimp and marbled salamander larvae, take notes on vegetation and wildlife, and measure water quality parameters.

Can the number of egg masses laid in a vernal pool vary naturally from year to year?
Yes, and because of this, we plan to monitor the pools annually over a long time period (10-15 years) in order to identify long-term trends and patterns. We will also monitor reference pools on protected lands (State Parks, Forests, etc.) to compare with data we will gather from pools in developed landscapes.

Will the monitors follow a standard procedure?
All monitors will follow a protocol that we have developed. Data will be collected on data sheet designed for the program. All CAWS volunteers will attend a field training session.

Will CAWS publish the results of the program?
We intend to periodically make public the data we gather.

Who can we contact to learn more about the program?
Please contact either Ed Pawlak (860-561-8598; ecosys@comcast.net),
Tom Ryder (203-454-2110; tryder@landtechconsult.com)
or Matt Sanford (203-271-1773; matts@miloneandmacbroom.com).

Agreement to Participate in CAWS' Vernal Pool Monitoring Program

I, _____, agree to participate in the Connecticut Association of Wetland Scientists ("CAWS") vernal pool monitoring program, based upon the following terms:

- My participation is completely voluntary, and was not forced upon me as a condition of approval or concession by an Inland Wetlands, Conservation, or Planning & Zoning Commission, or any other municipal agency.
- The outcome of the monitoring, which is anticipated to run for 10-15 years, will not affect any permits I receive(d) to conduct regulated activities on the subject property.
- The monitoring will be conducted pro bono, at no cost to me, by trained volunteers. Typically there will be 1-2 annual inspections during early to mid-spring.
- Monitors will not be permitted to disclose the data that they collect for this program without the express consent of the CAWS Board of Directors.
- In order to provide access for future monitoring inspections, the vernal pool(s) and any necessary additional land have been, or will be, placed in Open Space or Conservation Easement. If these areas are covered by a Conservation Easement, the language of said easement must allow for annual monitoring inspections of the vernal pool(s).

Project Information

Project name:

Project address:

Owner/Applicant Information

Name:

Address:

Phone:

_____ _____

Signature of Owner/Applicant Date

Data Disclosure Agreement
CAWS Vernal Pool Monitoring Program

As a volunteer in the CAWS Vernal Pool Monitoring Program, I appreciate the potential sensitivity of the data that I will be collecting during annual vernal pool monitoring inspections.

I understand that the premature and unauthorized release of these data could jeopardize the long-term success of the program, since it could discourage landowners from participating in the program.

Therefore, I agree to make no unauthorized release (i.e., qualitative, quantitative, written, oral) of any monitoring data that I collect for the program.

I agree that only the CAWS Board of Directors can authorize such data disclosure.

_____
Printed Name of Monitor

_____ _____
Signature of Monitor Date

Correspondence

Section 404(f) Farming Exemption Criteria Clarification

Activities which qualify for the agricultural exemption under Section 404(f)(1) C of the Clean Water Act are "normal farming, silviculture, and ranching activities such as plowing, seeding, cultivating and minor drainage[1] that are part of an established (ongoing) operation."

Stock ponds are also included in the exemption. Specifically, the Corps does not regulate the excavation associated with creation or maintenance of a farm pond itself except under the conditions discussed below.

However, any discharge of fill material into Waters of the United States, incidental to the creation of a farm pond must have a permit if:

a) It is part of an activity whose purpose is to convert an area of the Waters of the United States into a use to which it was not previously subject, and
b) Where the flow or circulation may be impaired, or the reach reduced

In most circumstances of a-b above, the activity becomes "recaptured" under Section 404(f) 2 of the regulation and will still require a permit from the Corps.

Recapture commonly occurs when:

1. Following excavation of a pond, some of the excavated material is placed as fill on the banks of the pond or in the source stream/ brook to regulate the proposed water level in the form of a berm, forebay, spillway, culvert or low headwall.

2. The excavated material is stockpiled adjacent to the work area in jurisdictional wetland areas, as defined by the Corps "three parameter" approach for delineation of wetlands.

3. Mechanized land clearing, leveling or other redistribution of soil occurs in jurisdictional wetland areas or streams for the purpose of leveling low lying areas for construction access, construction of a temporary or permanent access road, or other non-water dependent and non-farm related activities.

4. A review of the information in support of the proposal indicates that the size and location of the pond is disproportionate to the quantity of water needed to support the principle farming operation.

The Corps will evaluate a proposal's applicability for Section 404(f) exemption on a case-by-case basis. Therefore, as normal procedure it is recommended that an applicant coordinate with the local Corps district by submitting an application with a request for both a jurisdictional determination and concurrence of applicability of the 404(f)(1) C exemption.

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[1] "Minor Drainage" (40 CFR 233.35 (a)(1)(iii)(c)(1)(iv)) – Does not include the construction of any canal, ditch, dike or other waterway or structure which drains or otherwise significantly modifies a wetland or aquatic area constituting Waters of the United States.

US Army Corps of Engineers

Presentation to Municipal Inland Wetland Staff Members

February 26, 2010

Barbara Newman
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Regulatory Division
U.S. Army Corps of Engineers, New England District
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Correspondence

Scope of Presentation

- Statutory Authority
- Definitions
- Regulated Activities
- Programmatic Permit Process
- When does a local applicant need a permit from the Corps?
- When is a local applicant in violation of federal law?

Rivers and Harbors Act of 1899

- Purpose is to protect Navigation
- Section 10 requires a permit for any work or structures in navigable waters
- Below the MHW

Marine Protection, Research and Sanctuaries Act of 1972

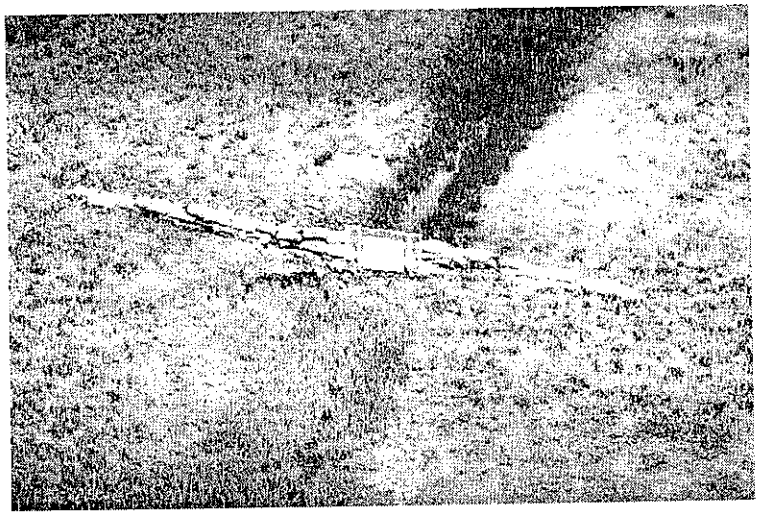
- designates marine sanctuaries for the purpose of preserving or restoring them
- Section 103 requires a permit from the Corps to transport dredged material for disposal in the Ocean

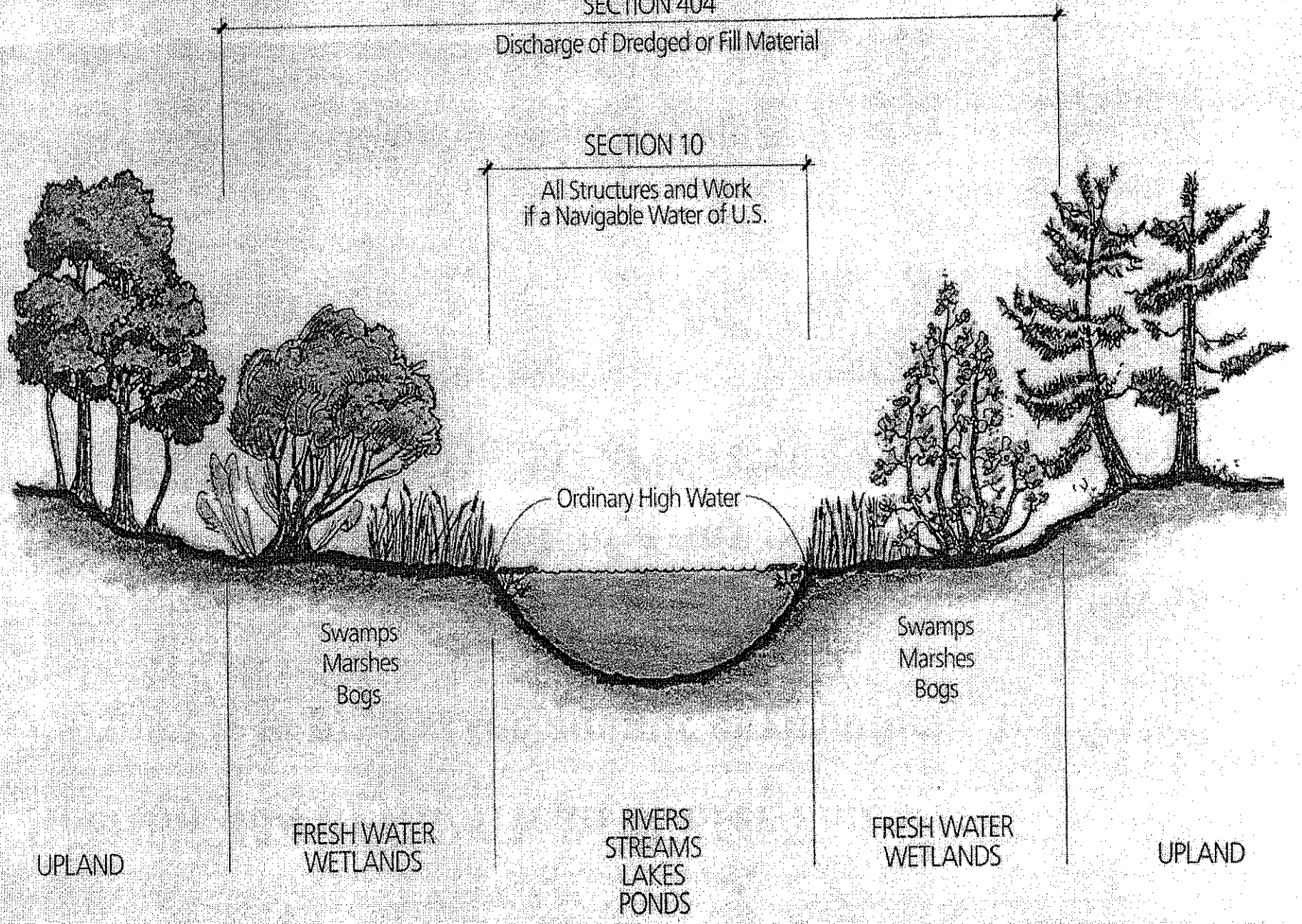
Section 404 of the Clean Water Act

Purpose is to protect the aquatic environment and foster balanced development

- **All "discharges" of dredged or fill material into "Waters of the U.S." require a Dept. of Army permit**

I will focus on Section 404 of the CWA for this presentation





Corps of Engineers Regulatory Jurisdiction in **FRESH WATERS**

Definitions

Discharge

Addition of dredged or fill material into Waters of the United States.

Fill material

Any material, e.g., rock, sand, soil, clay, plastics, construction debris, and wood chips, used for the primary purpose of replacing an aquatic area with dry land or changing the bottom elevation of a water body.

Waters of the United States

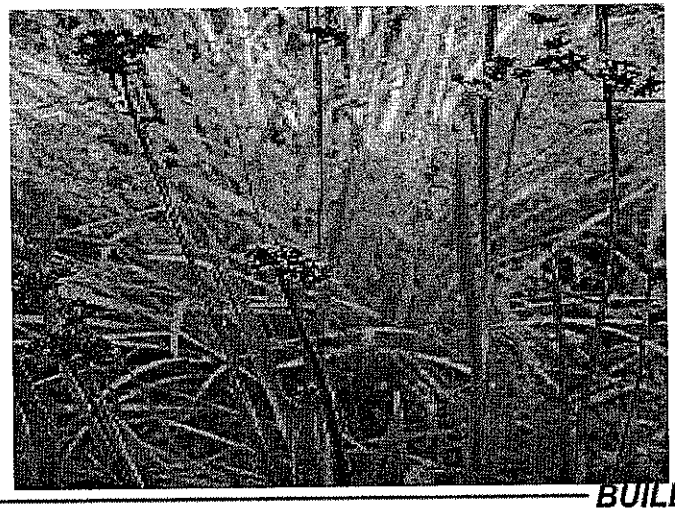
Includes navigable waters, inland rivers, lakes, streams, and adjacent, contiguous and bordering wetlands, or any other waters including intermittent streams, mudflats or wet meadows which could affect interstate or foreign commerce - *33 CFR § 328.3*

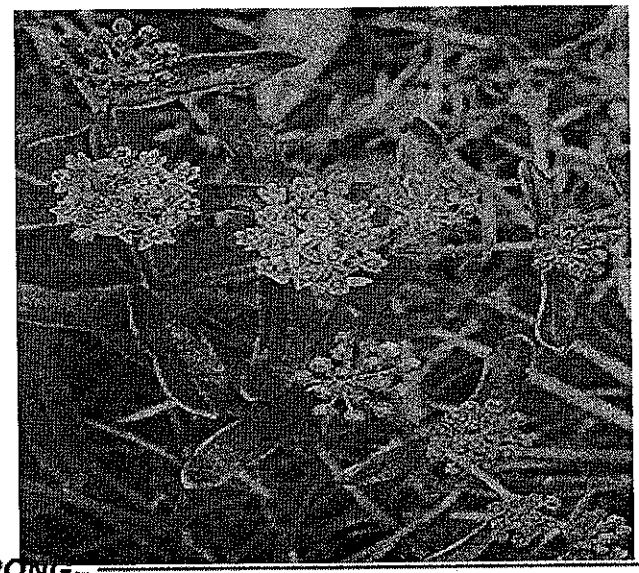
Definitions, cont.

Wetlands

- "Inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances, do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

- Federal delineation of a wetland boundary determined by presence of vegetation, hydrology and soils

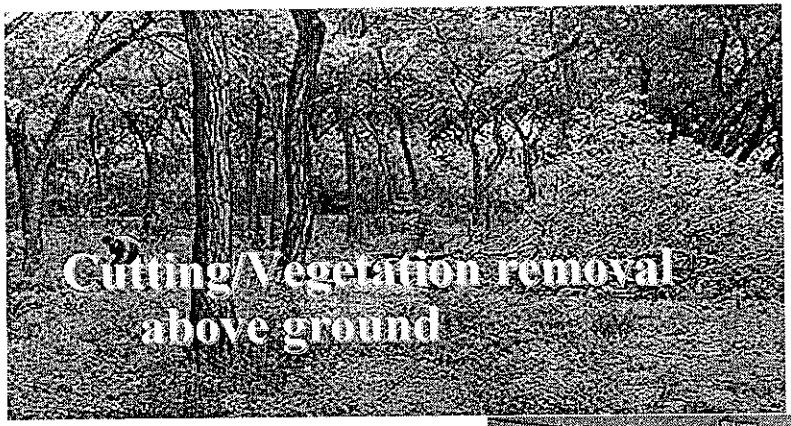


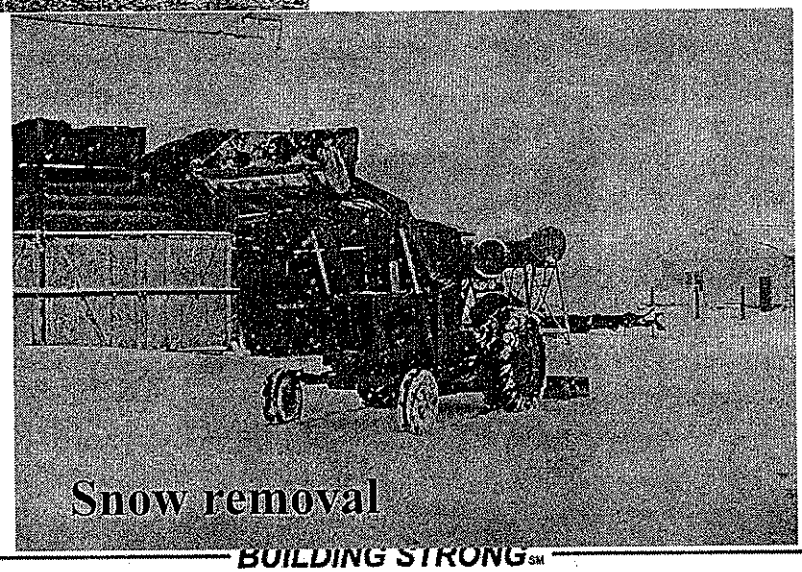


Section 404 Activities (If they are in waters, wetlands)

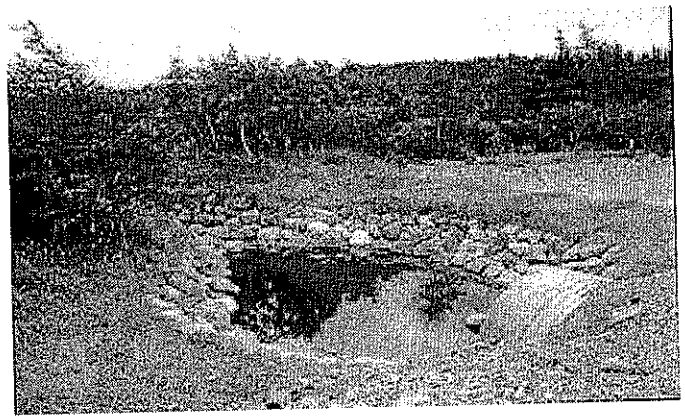
- Bedding/backfill, Culverts & Cofferdams
- Grading/Leveling - Land Development
- Access roads
- Stump Removal
- Bank stabilization
- Hazardous waste remediation sediment removal, UNLESS Superfund Site
- Outlet scour protection
- Discharge of Dredged material
- Excavation (not always considered fill.)

Activities Not Considered a "discharge"

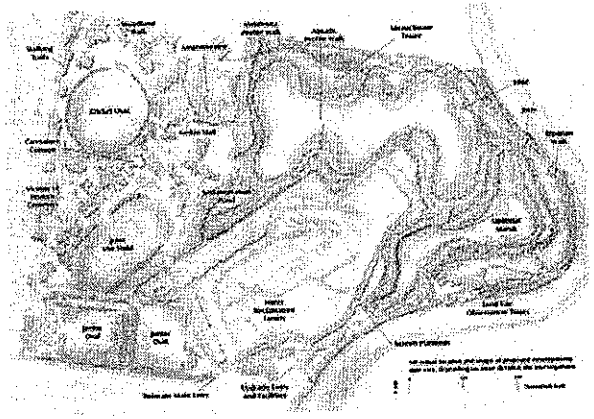




"**General Permit**"
Minimal Impact Activities
Expedited Process



"**Individual Permit**"
Larger, more controversial
Requires analysis of alternatives on-site and off
Require public notice



Programmatic General Permit

- Unique to New England
- Partnership with State and Federal Agencies
- Two Categories of authorizations

Category I **No application** ***New form to be filled out**	
<5000 square feet of *direct and indirect*, permanent and temporary, *for a single and complete project* **Eligible activities-** **Utility Line ROW Crossings** **Driveway/Roadway Crossings** **Stream Bank Stabilizations** **Repair and maintenance** **Must comply with the PGP, e.g.** **Must use BMP e.g. silt curtains** **Must coordinate with SHPO** **And THPO** **Must apply for local and state permits, if required**	**Exceptions:** **No impact to Special Wetlands, e.g. vernal pools, fens, bogs (defined in PGP)** **No ES, Historic sites, Tribal sites** **No work below OHWM in a FEMA floodway** **No detention of storm water** **No piping, boxing, or covering except for a driveway or roadway crossing** **No dam, levees, water diversion structures** **No adverse impact to hydraulic char. of a FEMA floodplain** **No relocating waterway**

Definition

- **Single and complete project-** means the total project proposed or accomplished by one owner/developer or partnership. Must have independent utility, meaning it would be constructed absent the construction of other parts or phases of other projects in the area.
- **Indirect or Secondary Impacts-**Includes impacts to waters, including wetlands, that are drained, dredged, flooded, cleared or degraded as a result of a project.

Category II permit- Reporting

>5000SF – 1 acre for a single and complete project

Direct and indirect, temporary and permanent fill

Eligible-

Utility Line ROW

Roadway or Driveway Crossing

Stream bank stabilization

Repair and Maintenance

Restoration Projects

Miscellaneous

Must comply with the PGP, e.g.

Must use BMP e.g. silt curtains

Must coordinate with SHPO

And THPO

Exceptions-

Fill placed in FEMA Fldway

fill adverse impacts to FEMA fldpln

Channeling inland waters

Piping boxing or covering inland waters for other than a driveway or roadway

Detention of storm water

Individual Permit

- Projects over 1 acre, including direct, indirect, permanent and temporary, single and complete
- Project that are not allowed to be Cat II under the PGP
- Public Notice is issued
- Review process tends to be longer and more intense

Example

Draining a 3/4 acre pond in order to excavate (in this case, not a discharge) accumulated sediments. Discharging 3000 square feet of fill (riprap) to stabilize embankments. Discharging 500 square feet for temporary mats and hay bales.

- Direct Fill =3000 SF
- Indirect/Secondary = 32,670 SF (draining pond)
- Temporary fill = 500 SF

This will be reviewed as Cat 2

The total SF of impacts exceeds 5000 SF, (it includes direct, indirect, and temporary.)

When does a local project need a federal permit?

Generally, if there is a discharge of fill into waters of the U.S., they need a permit. However….

- If under 5000 SF, Cat 1, may not need to apply for one, need to look at the PGP or call the Corps.
- If over 5000 SF, Cat 2 or Individual Permits, definitely need one!
- Remember fill includes certain types of activities

When is a project in violation of federal law?

- When there is less than 5000 square feet of fill and the proponent has not gotten a local permit, and/or did not follow the requirements of the PGP
- When over 5000 square feet of fill has been placed in waters and wetlands and the proponent has not received a federal permit!
- remember the activities that are considered fill, e.g., stump removal, excavation by moving the soil around, as with an excavator

Correspondence

US Army Corps
of Engineers ®
New England District

Category I Eligibility Determination Form
(For All Inland Activity Projects in Connecticut)

This form **must be submitted before** work under Category I of the General Permit **before** work commences to the following address. Call (978) 318-8335 with any questions.

Chief, Permits & Enforcement Branch (CT)
New England District
U.S. Army Corps of Engineers
696 Virginia Road, Concord, MA 01742-2751

Permittee Name: _____

Permittee Address: _____

City, State & Zip Code: _____

Phone(s) and _____ Email: _____

Work Locations/Address: _____

City, State & Zip Code: _____

Work Area Latitude and Longitude Coordinates _____

Check all that apply:

□ Inland Waters □ Inland wetlands □ Tidal Inland Waterway

Area of wetland impact: _____square feet (SF)

Area of waterway impact below ordinary high water: _____linear feet and _____SF

Area of compensatory wetland mitigation provided: _____ SF

Briefly describe work and attach 8"x 11" Locus map and Overview Site Plan: _____

_____

_____

Waterway name: _____

Will American Recovery and Reinvestment Act (ARRA) funds be used for any of this project? _____

Contractor: _____ Contractor Address: _____

City, State & Zip Code: _____Phone(s) & Email: _____

Proposed Work Dates: Start:_____ Finish:_____

Your signature below, as permittee, indicates that you accept and agree to comply with the terms, eligibility criteria, and conditions of Category 1 of this Connecticut General Permit.

Permittee Signature: _____ Date:_____

APPROVAL OF MINUTES

January 19, 2010, February 2, 2010 (included in last packet)
&
March 2, 2010

Inland Wetlands and Watercourses Meeting

INLAND WETLANDS AND WATERCOURSES AGENCY
MINUTES OF A REGULAR MEETING
TUESDAY, March 2, 2010

A Regular Meeting of the Enfield Inland Wetlands and Watercourses Agency was held on Tuesday, March, 2, 2010 in the Council Chambers, Enfield Town Hall, 820 Enfield Street, Enfield, Connecticut.

MEMBERS PRESENT:	Douglas Maxellon, Chairman Maryann Abar, Alternate (seated) Joseph Albert Robert Lemay Jo-Marie Nelson Robie Staples Patrick Szczesiul, Alternate (seated)
MEMBERS ABSENT:	Karen Camidge Brian Peruta
ALSO PRESENT:	Katie Bednaz, Wetlands Agent Susan Berube, Recording Secretary

REGULAR MEETING

1. Call to Order: The meeting was called to order by Chairman Douglas Maxellon at 7:00 p.m.

2. Roll Call: Present were: Chairman Maxellon and Agents Abar, Albert, Lemay, Nelson, Staples, and Szczesiul. Also present were Katie Bednaz, Wetlands Agent and Susan Berube, Recording Secretary.

Agents Abar and Szczesiul were seated as full voting members for this meeting by Chairman Maxellon.

3. Pledge of Allegiance: The Pledge of Allegiance was recited.

4. Executive Session
(Matters regarding specific employees, pending litigation, acquisition of real estate and / or matters exempt from disclosure requirements): None.

5. Public Hearing
a. **IW-534- Enfield Properties** - is requesting a permit to construct two office buildings and five residential apartment buildings 153 South Road and adjacent lots (Map 55, Lots 80, 93 & 99), within the regulated area. Submitted 12/15/09, received 12/15/09, PPE 12/29/09, MPHCD 2/23/10, **EMPHCD 2/2/10**. Agent Staples recused himself from discussion of this application and left the meeting room.

Frank Troiano and Dave Ziaks, P.E. represented the applicant.

Mr. Ziaks noted that the applicant had thoroughly reviewed the plans with the Agency

members at the meeting of 02/16/10 and answered members' and staff's questions at that point. There were no members of the public present at that meeting.

The Town's engineering department has had additional comments since that meeting and these comments have been addressed.

Mr. Ziaks noted that he received a memo dated today from Mr. Cabibbo, the Town's engineer, and those issues have or will also be addressed. He stated that Mr. Cabibbo's concerns over lighting will be addressed with the PZC.

Ms. Bednaz's memo of 02/24/10 had 19 comments and Mr. Ziaks believes that these have also been addressed. He proceeded to give Ms. Bednaz the written narrative on feasible and prudent alternatives, which she stated would be distributed to members in their next meeting packet.

Mr. Ziaks went on to say that the applicant doesn't have any real issues with any of the comments and proposed conditions of approval. His only concern was that of #9b which requires an independent inspector for erosion control.

Mr. Ziaks explained that the PZC will require a condition of approval for that same task, including all improvements.

He stated that he usually does the inspections for Mr. Troiano's projects; this IWWA requirement seems redundant and an extra expense for the applicant.

The project does not include any steep slopes, deep cuts or large fills.

He feels that the PZC required inspections will be more than appropriate to cover the erosion control inspections.

He went on to state that there will only be minor adjustments that need to be made to the plans, based on Ms. Bednaz's comments.

Two complete sets of plans have been submitted. Changes can be incorporated and new sets submitted or the plans of 02/10/10 can be used with the adjustments and conditions of approval added.

Ms. Bednaz read Mr. Cabibbo's memo of 03/02/10 into the record.

Ms. Bednaz referred to her Agent Review memo dated 02/24/10, item 13, stating that she is unsure where it is located. She wants to be sure it is not draining the wetland and feels that it is important to se it in the field.

She also noted that the phasing plan has been submitted and will be included in the members' next packet.

She added that the public hearing can be closed this evening or the Agency can request an extension from the applicant.

She also added that Agent Peruta had emailed her, requesting additional conditions of approval, such as specifying the work being done for the neighbor.

Ms. Bednaz asked that the access to the mitigation areas by the stream and depression area be spelled out.

She also noted that rotational mowing is part of the mitigation. It will need to be done beyond the 5 year permit period. How will this condition be maintained? It could be made part of the site plan approval. Collaboration will need to take place with PZC on this, perhaps as a written recommendation to the PZC from the IWWA.

Agent Abar asked when outlying mitigation would be done, since the project is planned to be completed in phases.

Mr. Ziaks stated that it would be done after phase 1 and should be shown on the phasing map.

Agent Albert expressed his concern that the memo from Ms. Bednaz was sent to the applicant and was not copied to Agency members. Also, her most recent comments on the plans this evening will require an extension of the public hearing.

Chairman Maxellon explained that the memo was sent to the applicant and to Agency members but the "cc" was not written on the memo. It has been Ms. Bednaz's regular practice to hold all new materials received after the packets are mailed, until the next packet is mailed.

Ms. Bednaz added that all materials were not received at the time of the initial application; the applicant had requested that her review be held until all materials were received. That is why the review is being done so late in the process. Her memo is just to make sure that all details are ironed out.

Agent Albert stated that he does not feel it fair to the IWWA or the applicant to have to keep the public hearing open because of new, last minute comments. He also asked if the erosion and sediment control inspection condition has been used in the past.

Ms. Bednaz replied that it was a condition of approval for the Simon Road "Villages" project.

Agent Albert requested that any information possible on applications be emailed to members.

Chairman Maxellon noted that if the material is part of a public hearing, it cannot be emailed to members.

Ms. Bednaz noted that she could email members individually, but not as a group.

Chairman Maxellon noted the difficult of reviewing material at the same meeting at which it was received, while trying to give the applicant full attention.

Agent Albert asked if Ms. Bednaz does soil tests.

Ms. Bednaz replied that she did conduct some soil tests on this site and visits projects while they are ongoing, but not as often as she'd like, which is why members have

been assigned projects to visit.

Agent Albert suggested that because of the size of the proposed project, Ms. Bednaz may need to visit the site more often.

Agent Nelson asked if new plans would be distributed with the changes to each member or if only one final set of plans would be provided for the file.

Ms. Bednaz replied that it is up to Agency members. Agent Albert had requested, at the last meeting, that he get everything, including all changes.

Agent Nelson stated that she felt that as long as all conditions are on the final set, only that one set would be necessary.

Chairman Maxellon added that any member who would like a set could have one.

Agent Nelson wondered if proposed condition 9b is applicable.

Ms. Bednaz explained that the potential for massive runoff is unlikely but this is a very large development that goes right up to the wetland. In the right conditions, a breach of erosion and sediment controls could make a huge problem.

Ms. Bednaz went on to say that she would like to visit all active sites at least once per week. Last season, she could only get to sites about once every other week. There are many interruptions and a great deal of paperwork in the office, making it difficult for her to get out into the field.

Agent Nelson stated that she felt that if Ms. Bednaz and Mr. Ziaks are inspecting regularly, and the assigned Agency member or members are also visiting the site, this should be enough.

Chairman Maxellon noted that he had been absent at the Agency's last meeting and asked if Mr. Coppler's memo had been introduced.

Ms. Bednaz stated that it was not read into the record but was mentioned and is in the permanent file.

Chairman Maxellon stated that his understanding is that the abandonment of the road is approved, per Mr. Coppler. If the Town Council decides against this, the applicant would need to return to the IWWA for a revision of plans.

He asked if the fire department's concerns have been addressed.

Mr. Ziaks stated that an additional access has satisfied the fire department's concerns. A question in Mr. Cabibbo's earlier memo regarding the entrance has also been clarified.

With regards to the erosion and sediment controls inspection, Chairman Maxellon suggested that the condition be incorporated with PZC conditions, but he does not feel that a separate inspector for IWWA is necessary.

Mr. Ziaks stated that the applicant agree with the timing and process for the inspections and a design professional will be performing the inspections, which is required by the State as well.

Mr. Ziaks also stated that if the IWWA does not wish to vote on the application this evening, the applicant will grant an extension to keep the public hearing open to the Agency's next meeting to finalize all plans and conditions. He will provide a letter to this effect to staff tomorrow.

At this time, the hearing was opened for public comment. No one in the audience came forward to speak.

Ms. Bednaz noted that she received communication from the Town's attorney regarding whether an easement or restriction for passive recreation is created. Parking would need to be available if it is advertised as a recreational area.

Also, the IWWA cannot have a say over whether or not outsiders can use the area.

Agency members briefly reviewed the proposed condition currently numbered 9b. It was the general consensus to remove from the first sentence "at reasonable cost" and "by the town and paid for by the applicant " and insert "by the applicant". The sixth and seventh sentences shall be removed completely.

Agent Nelson asked about condition 9c.

Ms. Bednaz explained the importance of seeing conditions on site during the process to get proper elevations and hydrology for the success of plantings.

Mr. Ziaks stated that this does not create a difficulty. It is standard protocol.

In response to Ms. Bednaz's question, Agents Lemay, Albert and Chairman Maxellon requested revised plans. Chairman Maxellon also requested that Agents Peruta and Camidge receive copies of the revised plans as well.

Mr. Ziaks stated that he will also provide a cd so that the plans can be downloaded onto the FTP website.

Ms. Bednaz also requested that the cd include a review of protocol of mitigation.

A motion was made at 7:46 p.m. to extend the public hearing on IW 534 to the meeting of March 6, 2010 at 7:00 p.m. in the Council Chambers. Vote was 6—0. The applicant verbally granted an extension of the public hearing; this will be submitted in writing to Staff.

Agent Staples returned to the meeting at this time.

b. **(TO COMMENCE 3/16/10) IW-535 - T.P. Rentals, LLC** - is requesting an amendment to the Town of Enfield Inland Wetlands and Watercourses Map for the property located on the south side of Hazard Avenue, immediately east of 150 Hazard Avenue (Map 74, Lot 118). Submitted 1/19/10, received 02/02/10, PPE 02/16/10, MAD 4/8/10, **MPHCD 4/6/2010.** This public hearing will commence on 03/16/10 at

7:00 p.m. in the Council Chambers.

6. Call to Order of Regular Meeting: The regular meeting was called to order at 7:48 p.m.

Roll Call: Present were: Chairman Maxellon and Agents Abar, Albert, Lemay, Nelson, Staples, and Szczesiul. Also present were Katie Bednaz, Wetlands Agent and Susan Berube, Recording Secretary.

Agents Abar and Szczesiul were again seated as full voting members by Chairman Maxellon.

7. Public Participation - Issues of concern not on the agenda: None.

A motion was made by Agent Nelson and seconded by Agent Lemay to amend the order of the agenda and move item 13A to just prior to item 8. Vote was 7-0-0. It was noted later in the meeting that item 13a should have been on the agenda as item 14 "New Items to be Received".

13. New Business

a. **IW-536 - Richard Lanagan -** is requesting a permit to clear trees and install a shed on 201 State Street (Map 35, Lot 248) within the regulated area. Clearing activities have already been conducted. Submitted 2/22/10, received 03/02/10, PPE 3/16/10, **MAD 4/6/10.** Mr. Richard Lanagan represented the applicant.

Ms. Bednaz explained that she visited the site and noted clearing taking place into the conservation easement area. She is working with the applicant regarding the easement line location. The proposed shed will be in the upland review area, just outside of the conservation easement.

Agency members reviewed photos provided by Mrs. Lanagan.

Five or six trees, vines and undergrowth were removed. The area is similar to what is on other, undeveloped lots on the same street.

Ms. Bednaz noted that it would be easier if the conservation easement line was straight but it would require an adjustment to the deed.

Mr. Lanagan reported that the easement stakes lines were installed by the developer today.

Ms. Bednaz noted that as part of the conditions of approval, debris located down over the hill was to be removed. This will be difficult because the items are large.

Mrs. Lanagan stated that the applicant plans to restore the cleared area with native trees and shrubs.

Mr. Lanagan added that now that the easement line is staked, the restriction line is acceptable and he will go back and fill in with shrubs and trees. He was unaware that a permit was necessary.

Ms. Bednaz also noted that there was a washout area. The applicant is willing to pull back materials to the original grade. There is also a sinkhole. The applicant has installed hay bales and he will remove any sediment that is 2" or more deep.

A small mini-excavator will be used to scrape the sediment that leaked and to remove debris. This will be done after the area is stabilized, likely in August.

Ms. Bednaz stated that the applicant may work with the developer to get the remaining debris out.

Agent Nelson noted her appreciation of the applicant working with the IWWA.

Ms. Bednaz noted that the plans were submitted and recorded but no paper copy was given to PZC or IWWA. She also noted that the proposed tree line on the "as built" is slightly off from the field.

Agent Szczesiul asked if the plantings will stop the erosion and is the shed all set to be approved.

Ms. Bednaz replied that the erosion will stop with the plantings and the hay bales will be kept at the bottom until the area is stabilized.

The shed would have been an authorized agent approval if the clearing had not taken place.

Chairman Maxellon noted that the site is in a public watershed. Should there be any input from the water company?

Ms. Bednaz replied that a letter was sent by certified mail, with no response to date. It actually sits on the edge of the watershed.

Chairman Maxellon asked if the applicant will be working with Ms. Bednaz regarding the type and number of plantings.

Ms. Bednaz replied that it is up to the IWWA.

Mrs. Lanagan stated that she had done some research and plans a variety of native species, such as eastern hemlock, American arborvitae and others. She and Mr. Lanagan will work with Ms. Bednaz.

Chairman Maxellon stated that this application cannot be acted on at this meeting, but can be at the Agency's meeting of March 16, 2010.

8. Correspondence: The following items of correspondence were received:
    a. IW-528 AB Container Email
    b. DEP Training Program Classes Handout
    c. Update - 123 Weymouth Road
    d. Map-Reading and Watershed Delineation Skills for Inland Wetland Commissioners Handout
    e. Porous Pavements Q & A Article

9. Commissioner's Correspondence

a. Site Visit Updates: Agent Lemay reported that he visited the Enfield Medical building recently; hay bales are still in place.

Agent Staples reported that he visited the Nitch property recently; the roadway over the wetland crossing was under water.

Ms. Bednaz replied that the road was designed to handle seasonal flows.

Chairman Maxellon asked if the Nitch project is ongoing.

Ms. Bednaz replied that it is not yet stabilized. Once growth is established, hay bales can be removed.

Agent Staples noted that as he was leaving the Nitch property he noticed that there are large sand piles going into the wetlands behind the court house.

Ms. Bednaz stated that she would visit the site to check on this.

Agent Nelson asked how members know when a project is closed out.

Ms. Bednaz explained that she requests a completion letter from the applicant. Otherwise, it requires checking the files.

Also, bonding is not released until a project is complete. Some applicants, however, forget that they have a bond so they may not remember that they actually have to close out a project. She also added that once an area is stabilized, the silt fence should be removed.

Agent Szczesiul asked if an easement layer could be added to the GIS system.

Ms. Bednaz agreed that this would be a good idea and will put it on the "wish list" for the IT department. She would also like to see a natural diversity base layer added. All layers would need to be updated regularly, with a disclaimer that the information provided may not be up to date.

10. Approval of Minutes -January 19, 2010, February 2, 2010 & February 16, 2010: Since Agent Peruta had requested changes to these minutes and he is not present this evening, it was suggested by Chairman Maxellon that voting on the minutes of the meeting of 01/19/10 be tabled.

A motion was made by Agent Nelson and seconded by Agent Albert to table the vote on approval of the minutes of the meeting of 01/19/10 to the meeting of March 16, 2010. Vote was 6-0-1(Abar).

Until the video of the meeting of 02/02/10 could be reviewed to determine who seconded 2 motions, it was the consensus of the members to table voting on these minutes also.

A motion was made by Agent Nelson and seconded by Agent Staples to table the vote on approval of the minutes of the meeting of 02/02/10 to the meeting of March 16,

2010. Vote was 7-0-0.

A motion was made by Agent Nelson and seconded by Agent Staples to approve the minutes of the meeting of February 16, 2010 as presented. Vote was 5-0-2(Lemay and Maxellon).

11. Wetlands Agent Report: A brief report was provided by Ms. Bednaz. The item at 123 Weymouth Road was addressed through the correspondence portion of the agenda and 201 State Street was addressed through IW 536.

Agent Approval was given for the shed at Five Guys Burgers & Fries on Elm Street. The shed is to be located in a previously disturbed area.

PetSmart has received a Certificate Of Occupancy. Hay bales are still in place and there is still a bond for erosion and sediment controls.

12. Old Business: None.

14. New Applications to be Received
a. Applications to be received after Town deadline for Agenda: None. A large application to reconstruct the bridge on South Maple Street is expected to be received in time for the Agency's next meeting.

15. Other Business
a. IWWA Fines Ordinance
b. IWWA Fee Schedule
c. IWWA Regulation Revisions: A motion was made by Agent Albert and seconded by Agent Nelson to table discussion on items 15a, b, & c. Vote was 7-0-0.

Ms. Bednaz noted that the wetlands map showing escarpment slopes is out of date. The State D.E.P. maps no longer show escarpment soils. She is trying to figure out a guide for applicants to help determine where escarpment soils and slopes are located. She stated that she will check to see how other towns are handling this.

Agent Albert asked if there has been any progress on getting badges for members that do not have one.

Ms. Bednaz replied that no one has contacted her regarding this.

Chairman Maxellon stated that he will call the police chief or Mr. Bromson tomorrow.

d. **Next regular meeting is Tuesday, March 16, 2010 at 7:00PM in the Council Chambers.**

16. Adjourn: A motion was made by Agent Albert and seconded by Agent Staples to adjourn the meeting at 8:38 p.m. Vote was 7-0-0.

Respectfully Submitted,

_____

Jo-Marie Nelson, Secretary

NEW BUSINESS

IW-536 – Richard Lanagan

INLAND WETLANDS AND WATERCOURSES AGENCY

Certified Mail: XXXXXXXXXXXXXX

WETLANDS PERMIT #IW 536

March 17, 2010

Richard Lanagan
201 State Street
Enfield, CT 06082

Dear Mr. Lanagan,

At a regular meeting held March 16, 2010, the Enfield Inland Wetlands and Watercourses Agency took the following action:

IW-536 – Richard Lanagan - is requesting a permit to clear trees and install a shed on 201 State Street (Map 35, Lot 248) within the regulated area. Clearing activities have already been conducted. - **Approved with conditions.**

The permit is issued subject to the following conditions:

STANDARD CONDITIONS

Prior to the start of construction:

1. The Inland Wetlands and Watercourses Agency or its designated Agent must be notified in writing within two business days of the commencement of permitted activities, and upon completion of said activities; a "business day" is a day when the Town Hall is open for business.

2. If the project requires that materials be removed from the site, the Inland Wetlands and Watercourses Agency or its designated Agent must be notified in writing within two business days of the commencement of permitted activities of where the removed materials will be deposited.

General Conditions of Approval:

3. This permit shall be valid for 5 years from the date of approval unless otherwise revoked or specifically extended;

4. All work and all regulated activities conducted pursuant to this permit shall be consistent with these terms and conditions hereof. Any structures, excavation, fill, obstruction, encroachments or regulated activities not specifically identified and authorized herein shall constitute a violation of this permit and may result in its modification, suspension, or revocation. Upon initiation of the activities authorized herein, the permittee thereby accepts and agrees to comply with the terms and conditions hereof;

5. This permit is not transferable without the written consent of the Enfield Inland Wetlands and Watercourses Agency **or its designated Agent**;

6. In issuing this permit, the Agency has relied on information provided by the applicant and, if such information subsequently proves to be false, deceptive, incomplete and/or inaccurate this permit shall be modified, suspended or revoked;

7. This permit shall be made a part of all construction contracts and sub-contracts pertaining to the proposed regulated activities and shall supersede all other contract requirements;

8. The permittee shall permit the Agency, its authorized representative(s) or designee(s) to make periodic inspections at any time deemed necessary in order to assure that the activity being performed under authority of this permit is in accordance with the terms and conditions prescribed herein;

9. No equipment or material including without limitation, fill, construction materials, or debris, shall be deposited, placed, or stored in any wetland or watercourse on or off site unless specifically authorized by this permit;

10. This permit is subject to and does not derogate any present or future property rights or other rights or powers of the Town of Enfield, and conveys no property rights or in real estate of material nor any exclusive privileges, and is further subject to any and all public and private rights and to any activity affected hereby;

11. Prior to the start of construction, adequate erosion and sedimentation control measures shall be implemented, and shall be maintained throughout the entire construction phase and shall meet or exceed the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, as revised, until the site has become stabilized with permanent vegetative cover. The construction site shall be left in a stable condition at the close of each day. An adequate stockpile of erosion control materials shall be on site at all times for emergency or routine replacement and shall include materials to repair silt fences, haybales, mulch, stone-riprap filter dikes or any other devices planned for use during construction. Additional erosion/stormwater control measures are to be installed as directed by the Inland Wetland Agency, its authorized representative(s) or designee(s) if field conditions necessitate. The permittee shall immediately inform the Department of Planning and Community Development of any problems involving wetlands or watercourses which have developed in the course of, or which are caused by, the authorized work;

12. All temporary barriers, including erosion and sedimentation controls are to be removed when the site is stabilized in suitable weather conditions. The site is considered stabilized when there is equal to or greater than 70% vegetative cover;

13. With the exception of the addition of the items stated in these conditions, this application is approved in accordance with the plans entitled "House As-Built Plot Plan, Lot 4 State Street, prepared for Carl Nelson, Enfield, CT", dated 8/26/08 and amended to 2/22/10 by the current homeowner. Amendments by current homeowner are sketched onto the computer drawn original plan. The approval is only for those items shown to be hand drawn. Any changes that would potentially cause greater impact to wetlands or watercourses, such as enlargement of the area of disturbance or reorientation of building footprints, from the plans shall require the permitee to come before the Enfield Inland Wetlands and Watercourses Agency for a Determination of Permit Need (Jurisdictional Ruling) or Permit Modification.

14. The Inland Wetlands and Watercourses Permit number shall be located on all future plans to any Town or State Agency.

Special Conditions of Approval:

15. The conservation easement shall be re-planted with the following as mitigation for the clearing that has taken place…**XXXXXXXXXXXXXX**

16. **??? Something about why the limit of clearing was not required to be re-established as required as part of the original approval for the subdivision????**

NOTE: This permit does not relieve the applicant from his responsibility to apply for any other permits required by local, state or federal agencies.

This authorization constitutes the permit required by Section 22a-39 of the Connecticut General Statutes. The decision legal notice will be published in the Journal Inquirer on **XXXXXXXXX, 2010**. Please note that the appeal period (15 days) begins as of the date of publication in accordance with Sec. 22a-43 of the State Statutes.

Issuance of the Inland Wetlands and Watercourses Agency permit does not abrogate the responsibility to obtain permits that may be necessary from other agencies at the local, state or federal level prior to commencing your project.

Should you have any questions regarding the contents of this letter, please feel free to contact me at 253-6358.

Sincerely,

Katie A. Bednaz
Assistant Town Planner/Wetlands Agent

cc. José Giner, Director of Planning
IW#536 File

NEW APPLICATIONS TO BE RECEIVED

XIW-01-02 – Town of Enfield Public Works – is requesting a permit to reconstruct and enlarge the South Maple Street Bridge over the Scantic River (Map 84, Lots 6, 7, 12, 14 and 21). Submitted March 3, 2010, received 3/16/10, PPE 3/30/10, **MAD 5/20/10.**

IW-10-02

Enfield Inland Wetlands and Watercourses Agency
Review Check List

Application Number: IW__	Name of Applicant: Town of Enfield
Date Submitted: 3 - 1 - 2010	Tittle of Project: South Main Street Bridge Replacement

In making their decision the Commission must consider the following: 1) the severity of environmental impacts; 2) if there are feasible and prudent alternatives; 3) trade-offs between long and short term impacts; 4) if there are irreversible and irretrievable losses of wetland or watercourses; 5) if there are possible negative effects to safety, health or reasonable use of the subject or downstream property; 6) the need to balance economic development and the need to protect the environment; 7) if there are measures that could mitigate impacts; 8) that there is no interference with local drainage or increase possibility of flooding. If however, an application goes to Public Hearing, the Commission must find there are no other feasible and prudent alternatives and the application is consistent with the purposes and policies of the Enfield Inland Wetland and Watercourse Regulations in order to approve a permit.

Topic	Response (Check if not otherwise indicated)	Explain any Avoidance / Mitigation Efforts
Wetlands on Site:	Surveyed / flagged ✓, Mapped ✓, Soils types: (Indicated on plans or in letter) ___	
On Site Septic with in 150 feet of wetlands:	No ✓, Yes __	
Wetland Encroachment:	No __, Yes ✓, Area ___ (Square feet)	Temp. Impact Only
Regulated Area:	No __, Yes ✓, Area ___ (Square feet)	Temp. Impact Only
Floodplain:	Approximate ✓, Elevation(s) 69 ± (MGVD)	Widen Bridge
Watershed(s):	Waterworks __, Grape __, Freshwater __, Beemans __, Scantic ✓, Buckhorn __, Boweyns __, Connecticut __.	
Watershed Location:	Upper __, Middle __, Lower ✓ Third	
Intermittent Stream	Defined channel? No ✓, Yes __: 2 of following 3 Flowing water (> one event): No __, Yes __ Scour and/or detritus: No __, Yes __ Hydrophytic vegetation: No __, Yes __	
Aquifer Protection Zone:	No __, Yes ✓, Notified Water Company ✓	Notice Added to Plans
Natural Diversity Data Base Species:	No ✓, Yes __ reviewed	
Escarpment:	No ✓, Yes __	
Pond / Lake Shore Line:	No ✓, Yes __	
Within 500 feet of the Town Boundary:	No ✓, Yes __, Which Town? ___ Have they been notified? No __, Yes __	
Application of Pesticides/ Fertilizers	Known __, Reason to Suspect __, None Documented ✓	
Storage or Use of Pollutants / Hazardous Materials:	Known __, Reason to Suspect __, None Documented ✓	
Ground Water Contamination:	Known __, Reason to Suspect __, None Documented ✓	
Storm Water:	Quality Renovated ✓, Quantity Managed ✓	G.P.S. 41 Sump
Snow Stockpiling in Proximity to Wetlands:	No ✓, Yes __	
Roof Drainage:	To Stormwater System __, To Adjacent Land __	

RECEIVED
MAR - 3 2010
PLANNING OFFICE
ENFIELD, CT

Enfield Inland Wetlands and Watercourses Agency
Review Check List

Topic	Response (Check if not otherwise indicated)	Explain any Avoidance / Mitigation Efforts
Run-off Calculations:	No __, Yes ✓	
Drainage Patterns Altered	No ✓, Yes __	
Scenic Vistas:	No __, Yes __	
Open Space Potential:	No ✓, Yes __	
Archeological Potential:	No __, Yes ✓	
Considerations for Public Hearings		
Significant Impact:	Are there"...activities, which may have a major effect or significant impact on the wetlands or watercourses?"	
Resulting from deposition or removal of material	No ✓, Yes __, Specify which: _____	
By changing the channel or inhibiting the natural dynamics of a watercourse system (including inter-basin transfers.)	No __, Yes ✓, Specify which: Channel width widening at bridge to meet ACOE Requirements. No impact to dynamics. Impacts are temporary	
By causing the diminution of the capacity to support flora and fauna, flooding, water supply, waste assimilation, drainage, recreation or other functions of a wetland or watercourse	No ✓, Yes __, Specify which: _____	
By causing substantial turbidity, siltation or sedimentation of a wetland or watercourse	No ✓, Yes __, Specify which: _____	
By causing substantial diminution of flow of a natural watercourse or, groundwater levels in a wetland or watercourse	No ✓, Yes __, Specify which: _____	

Enfield Inland Wetlands and Watercourses Agency
Review Check List

Topic	Response (Check if not otherwise indicated)	Explain any Avoidance / Mitigation Efforts
By causing or having the potential to cause pollution to wetlands or watercourses	No ✓, Yes __, Specify which: _____ _____	
By destroying unique wetland or watercourse areas having demonstrable scientific or educational value	No ✓, Yes __, Specify which: _____ _____ _____	
Public Interest	No ✓, Yes __	
Petition with 25 signatures	No ✓, Yes __	
Within 500 feet of Town Boundary	No ✓, Yes __, Which town(s) should be notified? _____	
Alternatives Presented to Commission:	No ✓, Yes __	
Are there no other prudent alternatives	No ✓, Yes __, Specify _____	
Are there no other feasible alternatives:	No ✓, Yes __, Specify _____	
Have abutters been notified by certified mail? No __, Yes __, How many __ of how many have responded __?		
Information Needs		
Site Plans:	General Area (including surrounding properties) ✓, Proposed / Existing Conditions (With Contours, Wetlands Regulated Area) ✓	
Plans for presentation that have features colored	No __, Yes ✓	
Abutters:	Names and addresses, No __, Yes ✓	
Right of Entry:	Given to Wetland Commissioners and Agent, No __, Yes __	
Additional Information:	_____	

State DEP Stormwater Permit Thresholds:

1 All Construction projects which <u>disturb</u> five acres or more acres of land area on a site,
2 Phased projects where individual phases are less than five acres but combined disturbance of all phases is greater than five acres,
3 Subdivision projects where the road installation is less than five acres, but the total of road and building lots is greater than five acres, and this applies regardless of when the individual lots will be developed or who will develop them.

Army Corps of Engineers Wetland Permit Thresholds:

5000 square feet of impacted area (e.g. drained, flooded, filled or cleared), 500 liner feet of bank stabilization.

Is the application complete? No __, Yes __, Missing: _____

Decision: Approved __, Denied __, Withdrawn __

Was bonding required? _____

The reason for the decision: _____

TOWN OF ENFIELD
INLAND WETLANDS & WATERCOURSES AGENCY
PERMIT APPLICATION & CHECKLIST

INSTRUCTIONS:

1. The Agency and the applicant may hold a pre-application meeting to examine the scope of a proposed regulated activity or to determine if the proposed application involves a significant activity.

2. Any person intending to undertake a regulated activity shall apply for a permit by completing the applicable parts of this nine-page application form (consisting of parts A, B, C & D).

3. For the purpose of this application:
   a. "applicant or person" means any person, persons, firm, partnership, association, corporation, company, organization or legal entity of any kind, including municipal corporation, governmental agency or subdivision thereof; and
   b. refer to the Town's Inland Wetlands and Watercourses Regulations for further clarification and guidance with respect to the standards and criteria used for application evaluation.

✓ 4. ~~Nine (9)~~ 11 copies of all applicable completed application materials shall be submitted unless otherwise directed in writing by the Agency or its designated agent.

✓ 5. Indicate which of the following circumstances fit this application and comply with the following referenced application requirements.

CIRCUMSTANCES	CHECK	REQUIREMENTS
Application for regulated activity	✓	Complete Part A only
Application also involves Site Plan, Subdivision, or Special Permit		Complete Parts A & B
Application involves a Significant Activity		Complete Parts A, B & C
Renewal or Extension for, or Amendment to an Issued Permit		Complete Part D only
Wetland Map Amendment		Complete Part E only

✓ 6. Applicant's Name: Town of Enfield

✓ 7. Address or descriptive location (e.g. north side of Hazard Ave. – 1,000 feet easterly of intersection with Palomba Dr.) of proposed regulated activity:
South Maple Street Bridge over Scantic River

✓ 8. Title of Project: South Maple Street Bridge over Scantic River Replacement.

TOWN OF ENFIELD
INLAND WETLANDS & WATERCOURSES AGENCY
PERMIT APPLICATION & CHECKLIST

PART A

All applications for regulated activities shall include the following information:

✓ A. Applicant's name: Town of Enfield - Public Works

✓ B. Applicant's address: 40 Moody Road
Enfield

✓ C. Applicant's phone number: 860.763.7599

✓ D. Applicant's interest in the property:
Public Works - Town owned Bridge

✓ E. Landowner's name: Town of Enfield - Public Works

✓ F. Landowner's address: 40 Moody Road
Enfield CT

✓ G. Landowner's telephone number: 860.763.7599

NA H. Written consent (dated and signed) from the landowner that expresses his knowledge of and consent to the application if the landowner is not the applicant.

✓ I. The total calculated area (in square feet) of wetlands and watercourses on the subject property: 533 square feet.

✓ J. The total calculated area (in square feet) of regulated area that would be disturbed by the proposed regulated activities (include regulated areas that provide access to and ample space to work around the regulated activities): 28954 square feet. within 200' of I/W limits

NA K. Submission of the appropriate application fee based on the fee schedule established in Section 19 of the regulations.

✓ L. Written narrative of sufficient detail that sets forth the purpose and a description of the proposed activity and alternatives considered by the applicant and why the application's proposal to alter the wetlands or watercourse was chosen. See Attached

✓ M. A location map at a scale of 1 inch = 2,000 feet identifying the geographical location of the property involved. See Attached

___ N. A map at a scale of 1 inch = 100 feet identifying the geographical location of the property to be affected by the proposed activity, adjacent lands, adjacent regulated areas, such upstream and downstream areas as may be identified by the Agency or its designated agent, and other pertinent features including, but not limited to, existing and proposed property lines, roads and drives, existing buildings and their utilities, topography, soil types from the published soil survey, the limits of inland wetlands, watercourses and conservation buffer areas, existing and proposed lands protected as open space or by private conservation easements, and types of vegetative cover.

✓ O. A site plan at ~~40'~~ 20' scale that provides sufficient detail showing existing and proposed conditions, including maximum building areas, in relation to regulated areas and measures proposed to mitigate the potential environmental impacts.

✓ P. A title block and legend of symbols used for each plan or map indicated the name of the project, landowner and applicant, name and signature of the person preparing the plan or map, date prepared and subsequent revision dates and scale.

Q. Certification as to each of the following:

✓ (1) Is any portion of the wetland or watercourse (on which the regulated activity is proposed) located within 500 feet of the boundary of an adjoining municipality?
____Yes No ✓
Name of Town(s):_____

✓ (2) Will traffic (attributable to either construction activities or to the completed project on the site) use streets within the adjoining municipality to enter or exit the site?
____Yes No ✓
Name of Town(s):_____

✓ (3) Will sewer or water drainage from the project site flow through and affect the sewage or drainage system within the adjoining municipality? ____Yes No ✓
Name of Town(s):_____

✓ (4) Will water runoff from the improved site affect streets or other municipal or private property within the adjoining municipality? ____Yes No ✓
Name of Town(s):_____

N/A R. If yes to the aforementioned question Q.(1), then provide documentation (copy of return receipts) that the applicable adjacent municipal wetland agencies were duly notified pursuant to the regulations.

✓ S. Copy of the STATEWIDE INLAND WETLAND ACTIVITY REPORTING FORM (attached) with all applicable sections completed by the applicant.

___ T. Names and addresses of abutting property owners as shown in the records of the tax assessor of the municipality as of a date no earlier than thirty (30) days before the date the application is submitted.

✓ U. Any other information the Agency or its designated agent deems necessary for the review and evaluation of the application.
Photographs, Bridge Condition Report

✓ V. Does this application include any regulated activity in a Floodplain?

☑ Yes – Please fill out Development Permit for Flood Hazard Areas
☐ No – Proceed to next question.

✓ Certification By Applicant

By my (our) signatures, I (we) hereby certify that:

i. the applicant(s) is (are) familiar with all of the information provided in the application and is (are) aware of the penalties for obtaining a permit by deception or by inaccurate or misleading information; and

ii. the Agency members and their designated agents are authorized to inspect the property, at reasonable times, both before and after a final decision has been issued, and after completion of the project.

SIGNATURE(S) OF APPLICANT(S): DATE:

03/01/2010

3/4/2010

CONNECTICUT DEPARTMENT OF
ENVIRONMENTAL PROTECTION
79 Elm Street
Hartford, CT 06106-5127

Arthur J. Rocque, Jr., Commissioner

GIS CODE #: ___ ___ ___ ___ ___ ___ ___ ___ ___
For DEP Use Only

Statewide Inland Wetlands & Watercourses Activity Reporting Form

Please complete this form in accordance with the instructions. Please print or type.

PART I: To Be Completed By The Inland Wetlands Agency Only

1. DATE ACTION WAS TAKEN: Year _____ Month _____
2. ACTION TAKEN: _____
3. WAS A PUBLIC HEARING HELD? Yes _____ No _____
4. NAME OF AGENCY OFFICIAL VERIFYING AND COMPLETING THIS FORM:

   (print) _____ (signature) _____

PART II: To Be Completed By The Inland Wetlands Agency Or The Applicant

5. TOWN IN WHICH THE ACTION IS OCCURRING: Enfield

   Does this project cross municipal boundaries? Yes _____ No ✓

   If Yes, list the other town(s) in which the action is occurring: _____, _____
6. LOCATION: USGS Quad Map Name: Broadbrook *AND* Quad Number: 23

   Subregional Drainage Basin Number: 4200
7. NAME OF APPLICANT, VIOLATOR OR PETITIONER: Town of Enfield
8. NAME & ADDRESS/LOCATION OF PROJECT SITE: South Maple Street @ Scantic River

   Briefly describe the action/project/activity: Bridge Replacement
9. ACTIVITY *PURPOSE* CODE: _____
10. ACTIVITY *TYPE* CODE(S): _____, _____, _____, _____
11. WETLAND / WATERCOURSE AREA ALTERED [must be provided in acres or linear feet as indicated]:

    Wetlands: 0.012 acres Open Water Body: _____ acres Stream: .012 linear feet
12. UPLAND AREA ALTERED [must be provided in acres as indicated]: _____ acres
13. AREA OF WETLANDS AND / OR WATERCOURSES RESTORED, ENHANCED OR CREATED: .012 acres
    [must be provided in acres as indicated]

PART III: To Be Completed By The DEP

DATE RECEIVED: DATE RETURNED TO DEP:

FORM COMPLETED: YES NO FORM CORRECTED / COMPLETED: YES NO

REV. 5/2001

TOWN OF ENFIELD
INLAND WETLANDS & WATERCOURSES AGENCY
PERMIT APPLICATION & CHECKLIST

PART B

All applications for a regulated activity that involve a land use proposal which is also subject to site plan review, subdivision, or special permit application, may be required to contain the following additional information (as determined by the Agency or its designated agent):

____ A. All wetland boundaries on the property shall be identified by a soil scientist and located by a licensed land surveyor. All wetland soil types shall be classified by the soil scientist.

____ B. The soil scientist shall consecutively number the survey tapes that mark boundary lines of wetlands that will be or may be affected by the proposed activity. The survey tapes shall be located by a licensed land surveyor and each tape location and number shall be plotted onto the site plan.

____ C. The soil scientist shall prepare a report that includes the name of the applicant and project, the location of and limits of the property investigated, the dates of the soil investigations, a brief soil description for each soil mapping unit investigated, the set of the consecutive numbers used on survey tapes to identify the wetland boundaries, and a certified statement that the wetland boundaries appearing on the site plan are to the best of his knowledge true and accurate.

____ D. All watercourses identified on the property shall be located and identified on the site plan to the satisfaction of the Agency or its designated agent.

____ E. A site plan shall be submitted at a scale of 1 inch = 40 feet, or a scale that exhibits greater detail, indicating the following: location and limits of all regulated areas; existing and proposed conditions in relation to regulated areas; location of prominent features within regulated areas such as bedrock outcrops, stone walls, trees deemed by the Agency or its agents to be of critical value and existing buildings and drives; names of abutting property owners; soil erosion and sediment control measures; any measures to detain or retain stormwater runoff or recharge groundwater; any plantings or habitat improvement; and any other measures proposed to mitigate the potential environmental impacts.

____ F. A map of sufficient scale shall be submitted indicating each surficial drainage area influencing each distinct wetland area or watercourse on the property.

____ G. A general written description of the physical and vegetative characteristics shall be submitted for each distinct wetland area.

____ H. Any other specific information reasonably requested by the Agency or its designated agent.

TOWN OF ENFIELD
INLAND WETLANDS & WATERCOURSES AGENCY
PERMIT APPLICATION & CHECKLIST

PART C

Not Significant

All applications for a regulated activity that involve a significant activity, as defined in Section 2.1.w. of the regulations, may be required to provide the following additional information (as determined by the Agency or its designated agent):

✓ A. Site plans for the proposed land use on the subject property which will be affected indicating details of: existing and proposed conditions; wetland, watercourse and regulated area boundaries; land contour intervals of the land and other topographical features; boundaries of land ownership; proposed regulated activities; and other pertinent features of the land use being proposed on the subject property for development. Plans shall be drawn by a licensed surveyor, professional engineer or landscape architect registered in the State of Connecticut or by such other qualified person.

✓ B. Engineering reports and analyses and additional drawings to fully describe the proposed project and any filling, excavation, drainage or hydraulic modifications to watercourses.

✓ C. Mapping of soil types consistent with the categories established by the National Cooperative Soil Survey of the U.S. Soil Conservation Service, delineation of all wetlands in the field by a soil scientist, and such field delineations incorporated onto the site plans.

✓ D. Description of the ecological communities and functions of the wetlands or watercourses involved with the application and the probable effects of the proposed regulated activities on these communities and wetland functions.

___ E. Description of how the applicant will change, diminish or enhance the ecological communities and functions of the wetlands or watercourses involved in the application, each alternative to the proposed regulated activity, and why each alternative considered was deemed neither feasible nor prudent.

NA F. Description of the chemical and physical characteristics of any proposed fill material to establish the desired type of quality of fill material to be used in all regulated areas.

✓ G. Measures which mitigate the impact of the proposed activity.

___ H. Maps and descriptions that identify downstream and downgradient regulated areas which are off-site and their condition, existing off-site structures on adjacent properties, and watershed or drainage area boundaries which influence the subject regulated area.

___ I. Any other specific information reasonably requested by the Agency or its designated agent.

_____

TOWN OF ENFIELD
INLAND WETLANDS & WATERCOURSES AGENCY
PERMIT APPLICATION & CHECKLIST

PART D

Any application to renew or extend the expiration date of a previously issued permit or amend an existing permit shall be filed with the Agency at least sixty-five (65) days prior to the expiration date for the permit in accordance with Section 8 of the regulations. Such application for renewal, extension or amendment shall include the submission of the appropriate application fee and set forth the following information:

____ A. The application shall state the name, address and telephone number of the permit holder, the address or locational description of the property involved and the dates of issuance and expiration of the permit.

____ B. The application shall state the reason why the authorized activities were not initiated or completed within the time specified in the permit.

____ C. The application shall describe any changes in facts or circumstances affecting the regulated areas or the property for which the permit was issued.

____ D. The application shall describe the extent of work completed for the activities authorized in the permit.

____ E. The application shall incorporate by reference the documentation and record of the original application.

TOWN OF ENFIELD
INLAND WETLANDS & WATERCOURSES AGENCY
PERMIT APPLICATION & CHECKLIST

PART E

Any application requesting changes or amendments to the Inland Wetlands and Watercourses Map, Town of Enfield, Connecticut, shall contain the following information:

____ A. The applicant's name, address, telephone number, and a written consent to the proposed action set forth in the application.

____ B. Applicant's interest in the land.

____ C. The geographic location of the property involved in the application, including a description of the land in sufficient detail to allow identification of the disputed wetland or watercourse areas.

____ D. The reasons for the requested action.

____ E. The names and addresses of abutting property owners as shown in the records of the tax assessor of the Municipality as of a date no earlier than thirty (30) days before the date the application is submitted to the Agency.

____ F. A map showing any proposed development of the property.

____ G. If required by the Agency or agent, present documentation by a soil scientist that the land in question does not have a soil type classified by the National Cooperative soils survey as poorly drained, very poorly drained, alluvial, or flood plain. Such documentation includes a 40' scale map of the land in question signed by a soil scientist on which the flag locations defining the boundaries of the regulated soil types are depicted.

____ H. Watercourses shall be delineated by a certified soil scientist, geologist, ecologist or other qualified individual for review by the Agency in making a determination.

Public Water Supply Watershed or Aquifer Areas
Project Notification Form

Requirement:
All applicants before a municipal Planning and Zoning Commission, Inland Wetland Commission or Zoning Board of Appeals for any project located within a public water supply aquifer or watershed area are required by Section 8-3i of the CT General Statutes (as amended by PA 98-115) to notify the affected water utility by certified mail within 7 days of the date of the application.

General Information:

✓ 1. Location map of the project site (please show enough information to locate site).

✓ 2. Site plans including soil erosion and sediment control plan which have been submitted to the town commission for review.

3. Project address South Maple Street over Scantic River

4. Total acreage of project site ≈ 3/4 Acres

5. Existing land use Road

6. Project description Bridge Replacement

7. Acreage of are to be disturbed including structures, additions, paving, and soil disturbance 37570 SF = 0.862 Ac.

8. Type of sanitary system (circle one)- septic system / public sewer/both/none

9. Number of existing or proposed floor drain and their point of discharge e.g. sanitary sewer, holding tank, or ground N/A

10. Water accessed by (circle one)- private well/public water/other/none;
If other, please specify

11. Distance of site disturbance to nearest watercourse or wetland 0.0'

12. Brief description of existing or proposed stormwater management system, including roof drainage, paved areas etc., and discharge points e.g. municipal sewers, drywells, streams, vegetated areas, detention basins etc. Catch basins w/ 4' Sumps Great Pond Separator, Riprap Pavers Apron, Protected Scour Hole

13. Type of heat for facility N/A

14. List of existing and proposed underground or above-ground storage tanks including age, capacity and contents N/A

15. List of potentially harmful chemicals stored or used on property (existing and proposed) and typical onsite volumes, including but not limited to petroleum products, lubricants, solvents, detergents and pesticides N/A

16. Describe any wastes generated and their means of disposal Bridge/roadway construction debris, disposal off site

17. Date application will be heard by Planning and Zoning Commission _____

18. Date application will be heard by Zoning Board of Appeals N/A

19. Date application will be heard by Inland Wetlands Commission _____

20. Name, address and telephone number of contact person for the project

40 Moody Rd, Enfield CT 06082

Ryan Hawkes — 3/4/2010

Name of person completing form — Signature — Date

South Maple Street Bridge Over Scantic River, Town of Enfield

Description:

The South Maple Street Bridge over the Scantic River is located 1750 ft south of State Route 190 (Hazard Avenue). The existing 70-foot-long, 15-foot-wide structure has a single 63-foot-long span between abutments, with a four-panel through steel Warren truss superstructure. Each of the two main trusses has a box girder top chord and paired angle lower members, all originally with riveted connections which have been replaced with bolts. The floor system of rolled I-beams includes three floor beams carrying six stringers.

The deck, with an upper surface about 15 feet above the Scantic River, consists of a bituminous concrete wearing surface over a reinforced concrete deck, spanning 2.5 feet between the stringers. The deck has a 1.5-foot-high concrete parapet on either side topped with galvanized steel guardrails attached with vertical W-shape members.

The abutments and U-type wingwalls are gravity type, constructed of reinforced concrete (c1956) and stone masonry (c1925) and founded on bedrock. The southern abutment is penetrated by two 5-foot diameter pipe culverts, and both abutments have smaller pipe culverts, to pass high river flows.

The bridge was built in 1925, repaired in 1931, repaired again with abutment reconstruction in 1956, heavily reconstructed in 1978-79, and repaired in 2003 with additional bolts. The repairs begun in 1978 greatly altered the superstructure, and included welded-on reinforcement of most major members, the addition of sway braces on outriggers, elimination of the lower chord in the end panels, and anchor blocks welded onto the truss ends to support steel rods which function as the lower chords.

North of the bridge, South Maple Street rises gradually towards Hazard Avenue with a paved width of approximately 25 feet, and passes the intersection of Dust House Road which meets South Maple Street from the west about 270 feet from the bridge. North of Dust House Road, South Maple Street traverses a steeper late glacial stream terrace.

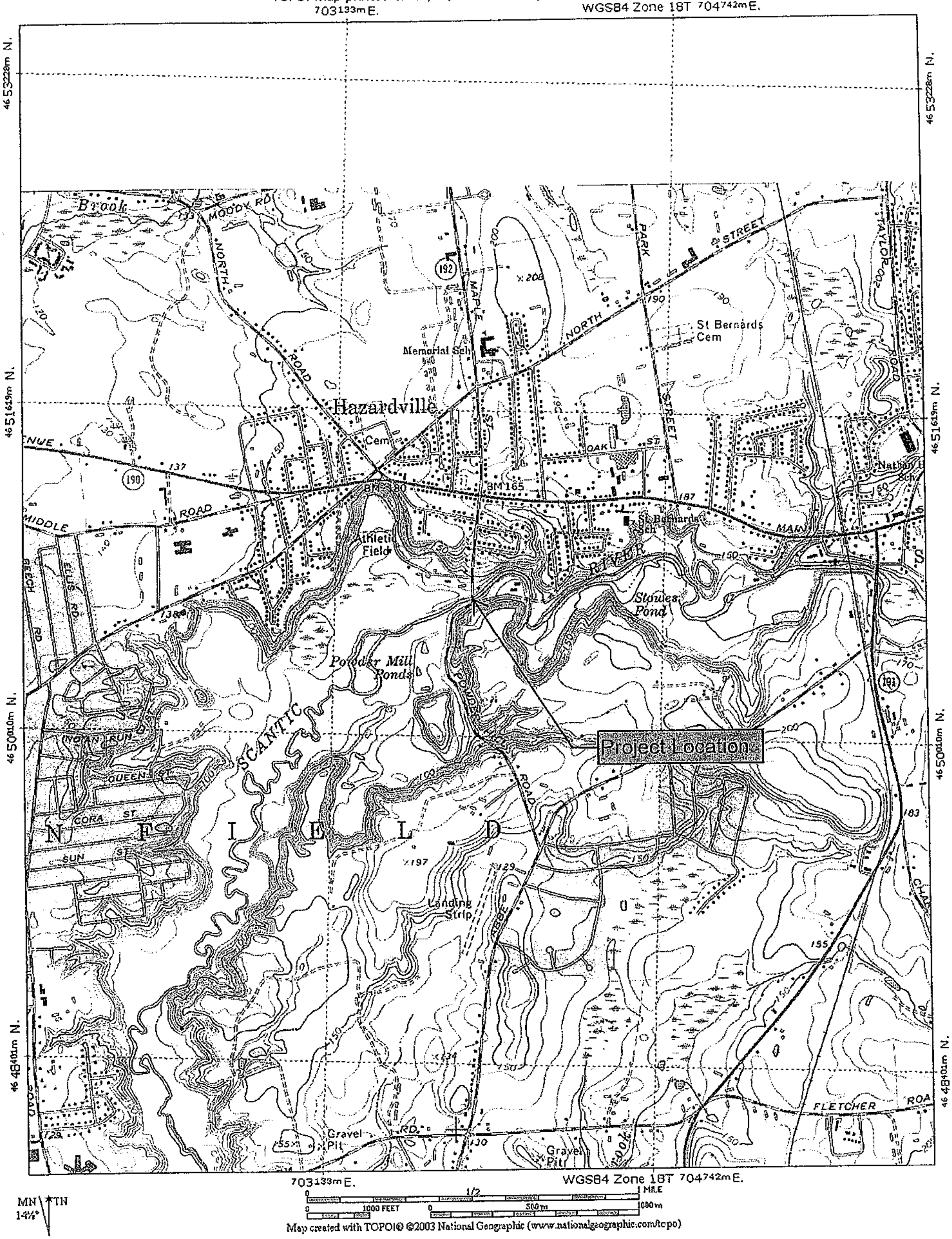
The proposed bridge replacement project will include removal of the existing bridge and most or all of its abutments, construction of a new 45-foot-wide bridge with a single 82-foot span and concrete abutment, and reconstruction of existing bridge approaches to a point about 40 feet north of Dust House Road to the north and to a point about 100 feet from the south end of the new bridge. There will be virtually no change in existing grade south of the river. North of the river, the grade will rise from 0-1.8 feet from north to south.

The estimated construction costs are $3.3 million. The project is being constructed with Federal (earmark) funding.

Mr. Piya Hawkes, P.E.
Director of Public Works
Stanley Jablonski Public Works Complex
Town of Enfield
40 Moody Road
Enfield, CT 06082

Office 860.763.7520
Fax 860.272.1143

TOPO! map printed on 11/24/09 from "CT.tp2" and "Untitled.tpg"



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XIW-10-02

South Maple Street Bridge Over Scantic River, Town of Enfield

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ENFIELD, CT

Wetland Impacts and Mitigation:

This project has temporary minor impacts to the regulated wetlands. The impacts are from construction activities necessary to demolish the existing structure and to construct the new bridge, which include the following:

- Installation of cofferdam systems on both sides of the watercourse,
- Removal of the concrete abutments and footings on both sides of the watercourse,
- Earth and rock excavation for the purposes of setting the new footing on competent/ sound rock,
- Placement of precast concrete bridge elements and grouting of the footings,
- Minor grading at the edge of the delineated wetlands for two drainage outfalls (One outfall southwest of the bridge and one northeast of the bridge),
- Placement of intermediate riprap to minimize scour along the abutments,
- Placement of natural streambed material,

The project's design has been coordinated with CTDOT and meets their requirements. The waterway opening will be wider than the existing to accommodate ACOE openness requirements and to better match the natural channel geometry upstream of the structure.

Specific mitigation measures incorporated into the design include:

- Improved waterway opening,
- Wildlife habitat accommodations on the north embankment,
- Placement of natural streambed materials over the riprap,
- Construction controls that minimize spill hazards,
- Stabilized drainage outfalls,
- All catch basins will have 4' deep sumps to catch sediments,
- A gross particle separator will be installed on the larger system north of the bridge,
- Shade trees have been added to the project to minimize the heat island effects,
- Isolation of the watercourse during in water work,

XIW-10-02

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REPLACEMENT OF SOUTH MAPLE STREET BRIDGE OVER SCANTIC RIVER

ENFIELD, CONNECTICUT BRIDGE NO. 03972

FINAL HYDROLOGIC DESIGN REPORT

October 27, 2009

GM^2 Associates, Inc.
730 Hebron Ave.
Glastonbury, CT 06033

For

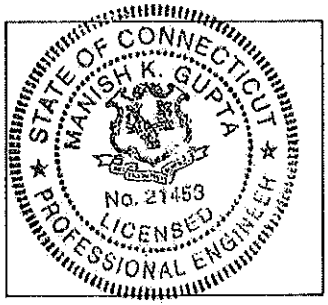
Tectonic Engineering and
Survey Consultants, P.C.
1344 Silas Deane Highway,
Suite 500
Rocky Hill, CT 06067

Prepared By:

Eric W. Buckley

Reviewed and Approved by:

Manish K. Gupta, PhD, PE
Approved Hydraulics Engineer



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Executive Summary

South Maple Street (CT Rte 192) is a two lane Urban Minor Arterial running north south, providing a connection from the Hazardville portion of Enfield across the Scantic River to Powder Hill Road which continues on to the Town of East Windsor. Carrying South Maple Street over the Scantic River is Bridge No. 03972. A bridge inspection conducted in 2009 has rated the bridge a 3 based on the condition of the superstructure, indicating that there is a need for corrective action. **TECTONIC ENGINEERING AND SURVEY CONSULTANTS, P.C.** are providing the Town of Enfield with bridge replacement design services, and have retained the services of **GM2 ASSOCIATES, INC.** for the purposes of developing hydrologic design flows for this reach of the Scantic River to be used on the subsequent hydraulic analysis of the replacement structure. This report documents the effort and results of that hydrologic analysis.

At Bridge No. 03972, The Scantic River is approximately 22.3 miles from its headwaters emerging In Massachusetts and conveys flows from a 69.7 sq. mi. watershed. The watershed area was delineated and measured using the StreamStats (version 2) Regional Regression Equation Utility maintained by the USGS (and hand checked for validity). The stream length was determined from the Physical Characteristics Data of Stream Gage 01184500 "Scantic River At Broad Brook, CT", subtracting the length of the stream between the project site and the referenced gage (downstream).

Scantic River is a regional watershed of the Connecticut River Major Drainage Basin. The Scantic River Watershed is characterized as mainly undeveloped with 60% of the land cover characterized by Deciduous, Coniferous and Mixed Forests. Residential areas are scattered throughout the watershed and comprise approximately 11% of the total area. Only 2.4% of the watershed is characterized as Commercial, Industrial or Urban. The remainder of the basin is comprised of pastures and farmland. These figures were developed using a GIS Application supported by the Watershed Modeling System. Data for these computations were originally compiled by the USGS and maintained on www.webgis.com. The basin shape used was obtained from the StreamStats (version 2) application. From review of the available mapping and aerial images covering the watershed area, it does not appear that there is any appreciable amount of flood storage.

For the purposes of this analysis, sub-basin storage was considered insignificant and not-considered; therefore flood routing calculations were not employed in the peak flow calculation. The Connecticut 2004 Regression Equations running on the USGS StreamStats (version 2) Web Utility was used to develop the 2-, 10-, 25-, 50-, 100- and 500-year events. This process included regional comparison to gauged watersheds of similar hydrologic characteristics, and where warranted, calibration by the results of comparison.

The recommended discharges for the subsequent hydraulic analysis of the replacement of South Maple Street Bridge over Scantic River are:

2-yr	10-yr	25-yr	50-yr	100-yr	500-yr
1050-cfs	2380-cfs	3205-cfs	3895-cfs	4715-cfs	6430-cfs

Table of Contents

Introduction

The Scantic River is a 29.5 mile tributary to the Connecticut River. The rivers headwaters originate in Stafford Connecticut and carve a path north through Massachusetts before turning again south after Hampden. Immediately upstream of the confluence with the Connecticut River, the Scantic River drains a total area of 114 square miles. The river approaches the subject bridge with a slope of 0.4% and carries surface water from a contributing basin of 69.7 sq. mi. The mean basin elevation as computed with StreamStats (version 2) is 449.5 feet. This basin also only depicts mild development consisting of mostly residential areas with comparatively lower industrial/commercial/urban areas. The majority of the basin is characterized by pervious land uses and cover consisting of forests and farmland.

Hydrologic Design

The 2004 Regional Regression Equations were used to determine the design flows for a subsequent hydraulic analysis of this bridge and its proposed replacement. In order to calibrate the results of this approach, a comparative basin analysis was conducted. The following is a discussion of the development of the final design flows. First, the drainage area was auto-delineated using the StreamStats (version 2) utility and checked for accuracy. Then the regression equations were run. The following raw flows were calculated at the South Maple Street Bridge.

2-yr	10-yr	25-yr	50-yr	100-yr	500-yr
1310-cfs	2980-cfs	4080-cfs	5020-cfs	6150-cfs	10600-cfs

Table 1 – raw results of regression equations for drainage basin contributing flows to South Maple Street Bridge.

Figure 1 illustrates the flood flow frequency with the average standard error for the pre-calibrated regression results.

In order to verify the results of the previous calculations of flows at the subject bridge, gauged basins of similar characteristics were sought out for comparison. Generally in doing the comparison, a gauged basin is selected for comparison based on certain characteristics including basin size, mean elevation, stream slope and length, and geographical location. Location of the gauge basin is deemed important in that the distribution of rainfall as well as mean basin elevation are key elements to the runoff response of a watershed to rainfall event. Two gage sites were found to be similar to the project site basin; Hockanum River near East Hartford and Saugatuck River near Westport. Both of these basins were used for development of the Connecticut Regression Equations. While both of these basins are characterized with similar drainage area and basin elevation to the subject site, the Hockanum River Gage also had similar precipitation averages. Due to the similarity of the precipitation averages, the Hockanum River Basin was used exclusively for the calibration of the StreamStats (version 2) results for the South Maple Street Crossing of the Scantic River.

Calibration

In checking and calibrating the regression estimates for the Scantic River near South Maple Street Bridge, the StreamStats (version 2) utility was used to compute flows at the Hockanum River gage location. The regression results were then compared to the weighted peak flow statistics for the gauge to determine a correction factor. Table 2 documents the regression results, weighted peak flow statistics and computed correction factor for gauge 01192500 (Hockanum River near East Hartford).

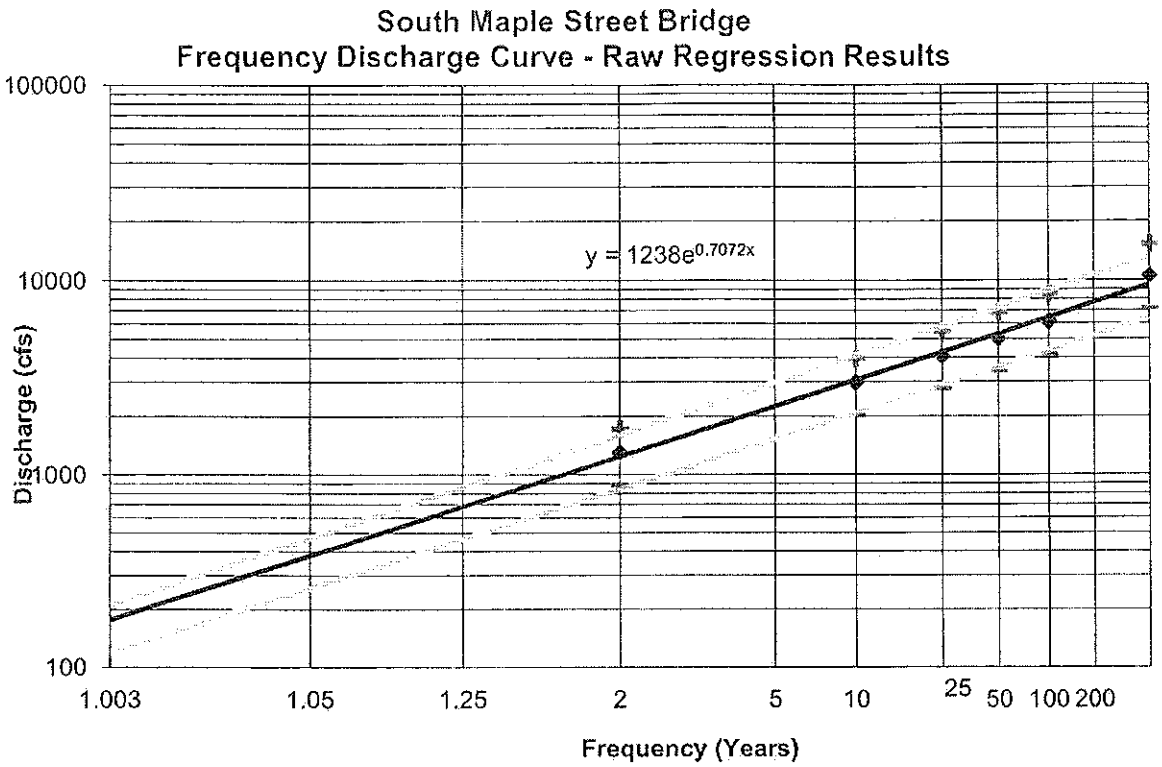


Figure 1 – Frequency Discharge Curve for the raw regression analysis results – orange lines represent the + and _ standard error

01192500 Hockanum River Near East Hartford, CT						
Drainage Area (sm)	Main Channel Length (mi)		Mean Basin Elevation (ft)		Stream Slope ($^{ft}/_{ft}$)	
73.4	23.8		447		0.069	
	2-yr	10-yr	25-yr	50-yr	100-yr	500-yr
Peak Flow Statistics (weighted)	1060-cfs	2260-cfs	3040-cfs	3700-cfs	4440-cfs	6670-cfs
Regression Results	1320-cfs	2830-cfs	3870-cfs	4770-cfs	5790-cfs	11000-cfs
Resulting correction factor (%)	0.80	0.80	0.79	0.77	0.77	0.61

Table 2 – Basin characteristics, peak flow statistics, regression equation results and correction factor for Hockanum River Gauge

The results of this comparison indicate that the statewide regression equations overestimate peak flows for basins in this sub-region of the state. Due to the strong correlation of drainage area characteristics between Hockanum River at the stream gauge and Scantic River at the South Maple Street Bridge, the correction factors from table 2 are used in determining the final design flows for South Maple Street over Scantic River.

Scantic River at South Maple Street Bridge						
Drainage Area (sm)	Main Channel Length (mi)		Mean Basin Elevation (ft)		Stream Slope ($^{ft}/_{ft}$)	
69.7	22.3		449		0.004	
	2-yr	10-yr	25-yr	50-yr	100-yr	500-yr
Base Regression Results	1310-cfs	2980-cfs	4080-cfs	5020-cfs	6150-cfs	10600-cfs
Correction Factor to Apply (%)	0.80	0.80	0.79	0.77	0.77	0.61
Calibrated Flows	1050-cfs	2380-cfs	3205-cfs	3895-cfs	4715-cfs	6430-cfs

Table 3 – Calibrated design flows for the hydraulic analysis of South Maple Street over Scantic River

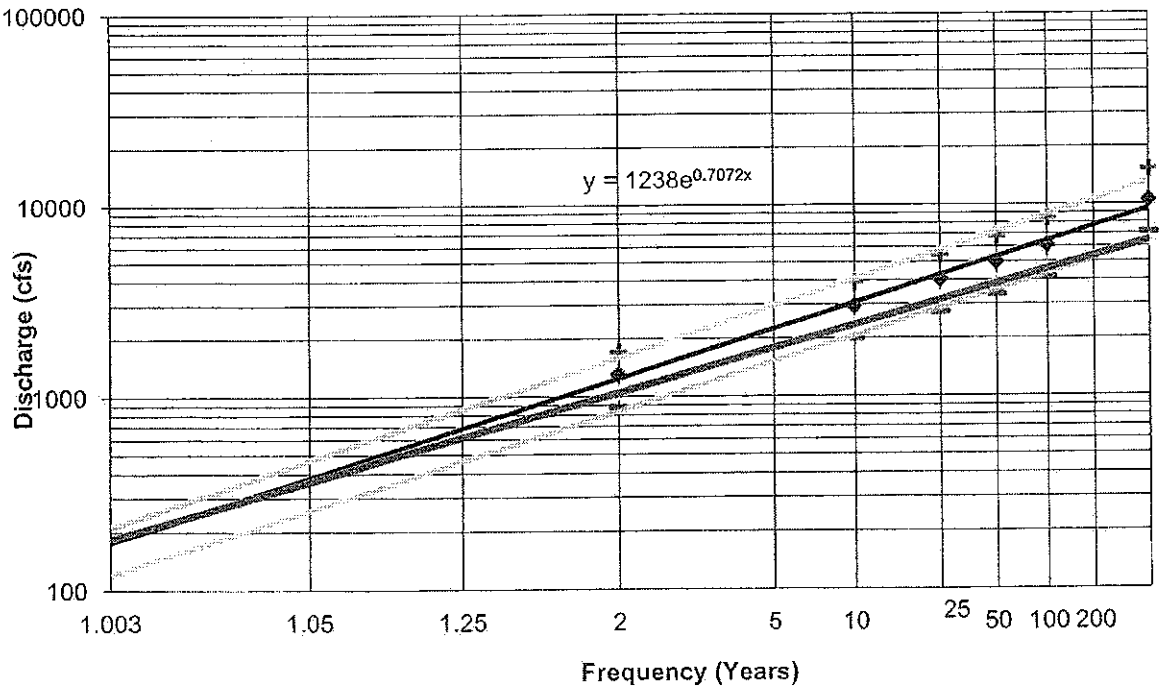


Figure 2 – Final Flood Frequency Curve: Black line – raw regression results, orange lines – standard errors, red line – corrected regression results.

Other Sources of Hydrologic Data

This reach of the Scantic River has been studied by only approximate methods as part of the Hartford County Flood Insurance Study maintained by FEMA. According to that study, The Scantic River gauging station was used to determine peak flow rates for the reaches south of the corporate boundary of Enfield that were studied by approximate methods. "Frequency discharge data for additional points ... Scantic River were derived by comparison with the gages' information using a discharge-drainage area ratio formula," $Q_1/Q_2=(A_1/A_2)^{0.75}$. Using the formula as reported in the FIS, the flows for the Scantic River near South Maple Street would be:

10-yr	50-yr	100-yr	500-yr
1932-cfs	4251-cfs	5743-cfs	10822-cfs

Figure 3 – Flows derived from information in the Hartford County FIS

The flow derivations as shown in the previous table are for informational purposes only. The subject reach of the Scantic River was studied by approximate methods and as such, there is no published regulated flow rate.

Conclusions and Recommendations

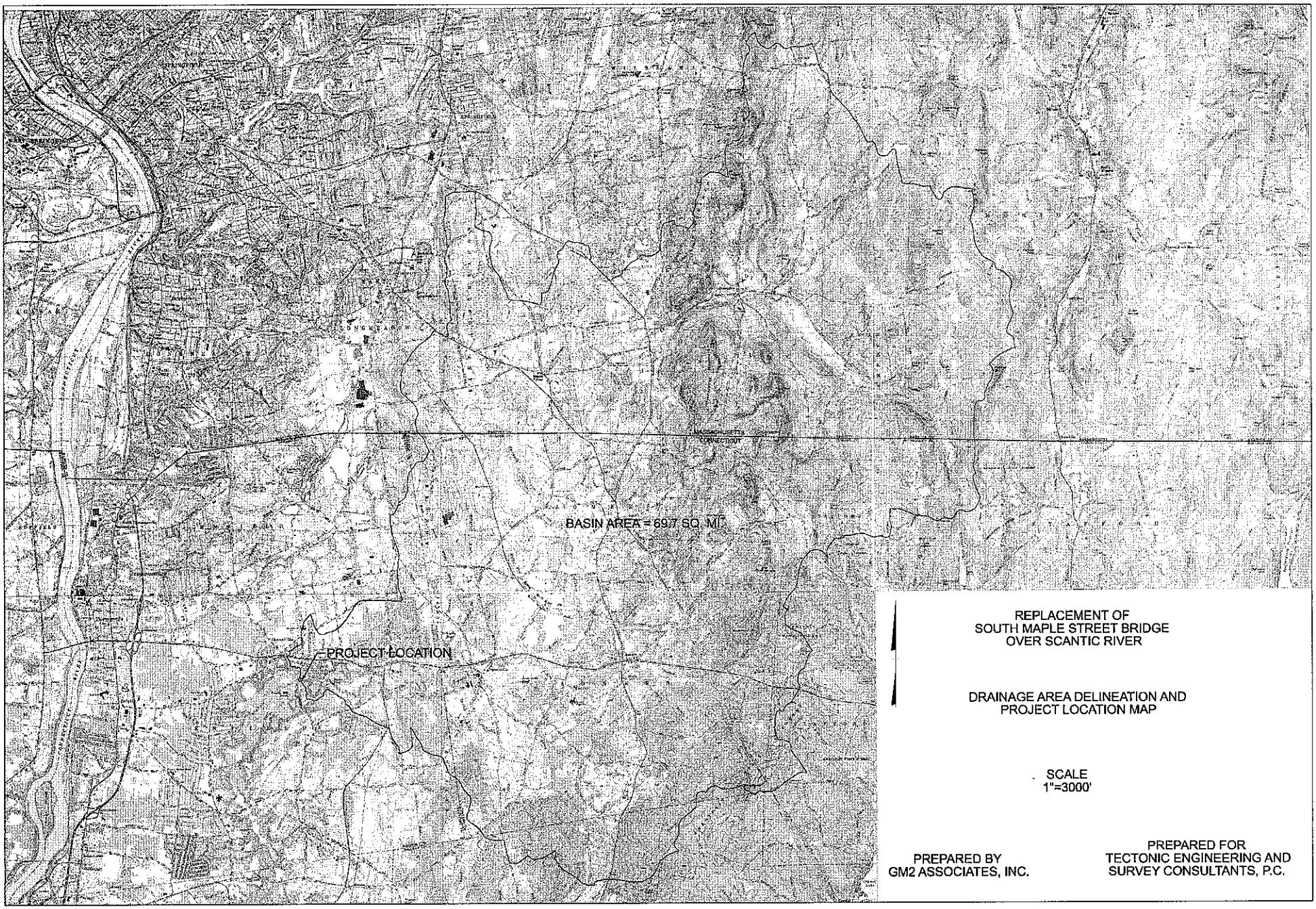
The analysis documented on the preceding pages describes a thorough means of determining the conventional design discharges for a watershed such as that conveying runoff to the South Maple Street Bridge in Enfield. The method employed includes a flow determination through the use and calibration of approved Regional Regression Equations for Connecticut. As a result of this investigation, it has been shown that the Regional Regression Equations for Connecticut may overestimate the potential peak flow for watersheds in this particular sub-region of Connecticut. For this investigation, the correction factors determined were applied to finalize the recommended design flows.

The flows recommended for use in the forthcoming hydraulic analysis of the Replacement of South Maple Street Bridge over Scantic River are:

2-yr	10-yr	25-yr	50-yr	100-yr	500-yr
1050-cfs	2380-cfs	3205-cfs	3895-cfs	4715-cfs	6430-cfs

Appendix

- Project Location Plate / Drainage Area Delineation
- Regression Equation Results
  - Automated Delineation
  - StreamStats (version 2) Site Report
  - Station Reports
    - Hockanum River Near East Hartford
- Correction Factor Calculation
- FEMA FIRM
  - Relevant excerpts from FIS
  - Flow derivation at project site



REPLACEMENT OF
SOUTH MAPLE STREET BRIDGE
OVER SCANTIC RIVER

DRAINAGE AREA DELINEATION AND
PROJECT LOCATION MAP

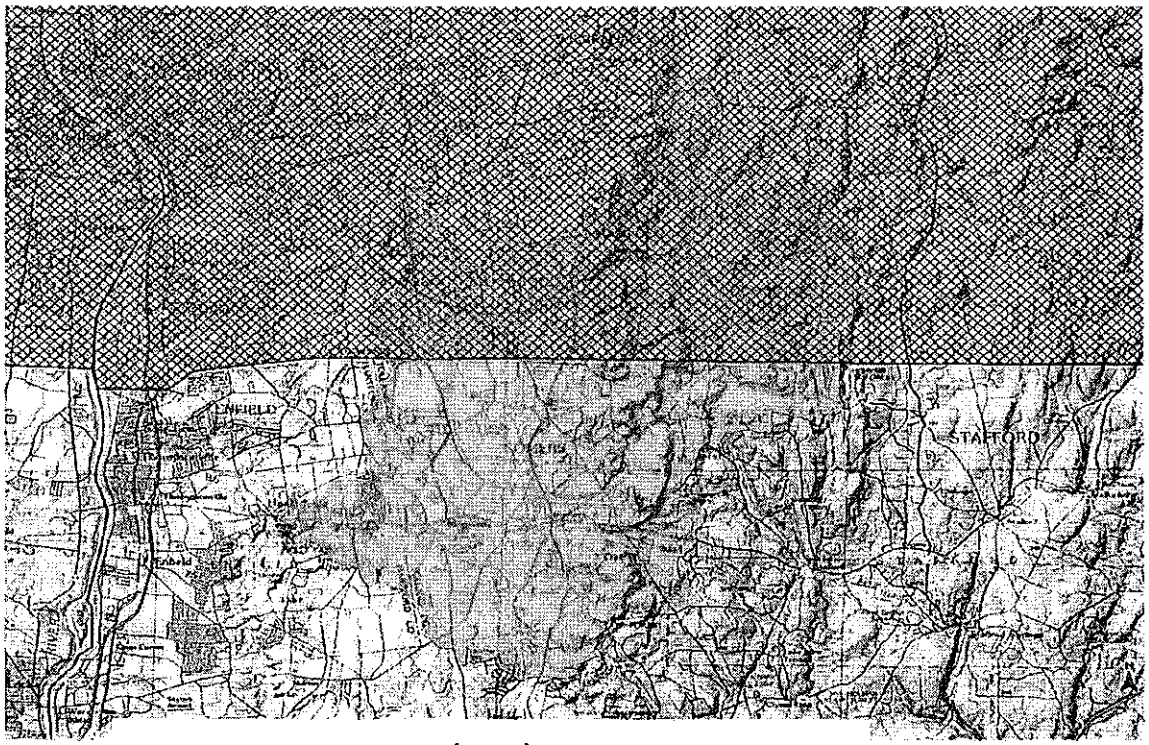
SCALE
1"=3000'

PREPARED BY
GM2 ASSOCIATES, INC.

PREPARED FOR
TECTONIC ENGINEERING AND
SURVEY CONSULTANTS, P.C.

USGS Connecticut Streamstats

Scantic @ S. Maple Street



Legend

GlobalWatershedPoint	NHD Flowline	Stream Gages	
GlobalWatershed	<all other values>	Gaging Station, Continuous Record	
Excluded Areas	ArtificialPath	Low Flow, Partial Record	
nhdgages	CanalDitch	Peak Flow, Partial Record	
nhddams	Coastline	Peak and Low Flow, Partial Record	
hucpoly	Connector	Miscellaneous Record	
Dendritic Stream Network	Pipeline	Unknown	
	StreamRiver		
	Underground Conduit		

Streamstats Ungaged Site Report

Date: Mon Oct 26 2009 09:19:42 Mountain Daylight Time
Site Location: Connecticut
NAD83 Latitude: 41.9820 (41 58 55)
NAD83 Longitude: -72.5399 (-72 32 23)
NAD27 Latitude: 41.9819 (41 58 54)
NAD27 Longitude: -72.5404 (-72 32 25)
Drainage Area: 69.7 mi2

Peak Flows Region Grid Basin Characteristics			
100% Statewide Multiparameter (69.7 mi2)			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	69.7	1.69	715
24 Hour 2 Year Precipitation (inches)	3.2	2.95	3.82
24 Hour 10 Year Precipitation (inches)	4.6	4.15	5.53
24 Hour 25 Year Precipitation (inches)	5.6	4.93	7
24 Hour 50 Year Precipitation (inches)	6.5	5.62	8.36
24 Hour 100 Year Precipitation (inches)	7.6	6.41	9.99
Mean Basin Elevation (feet)	449.51	169	1310

Peak Flows Region Grid Streamflow Statistics					
Statistic	Flow (ft^3/s)	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
				Minimum	Maximum
PK2	1310	32	3.5		
PK10	2980	33	8.1		
PK25	4080	34	11		
PK50	5020	36	13		
PK100	6150	38	14		
PK500	10600	45	15		

USGS Connecticut Streamstats

Basin Characteristics Report

Date: Mon Oct 26 2009 09:18:35 Mountain Daylight Time
NAD83 Latitude: 41.9820 (41 58 55)
NAD83 Longitude: -72.5399 (-72 32 23)
NAD27 Latitude: 41.9819 (41 58 54)
NAD27 Longitude: -72.5404 (-72 32 25)

Parameter	Value
24-hour, 2-year precip	3.2
24-hour, 25-year precip	5.6
24-hour, 10-year precip	4.6
Area in square miles	69.7
24-hour, 100-year precip	7.6
Average elevation in feet	449.51
24-hour, 50-year precip	6.5

Appendix 2. Hydrologic characteristics for streamflow-gaging stations used in the regression analysis for Connecticut.

[Hydrologic characteristics determined using digital data sets (Connecticut Drainage Basin Boundaries, USGS Digital Elevation Models, and 24-hour rainfall from the Northeast Regional Climate Center) and GIS technology. Elevations referenced to North American Vertical Datum of 1988. mi^2, square miles; ft, foot; in., inches; DA, drainage area in square miles; EL, mean basin elevation in feet; P_X, 24-hour rainfall for x-recurrence interval in inches]

U.S. Geological Survey streamflow-gaging station		Hydrologic characteristics						
Number	Name	Drainage area (mi^2)	Mean basin elevation (ft)	2-year, 24-hour rainfall (inches)	10-year, 24-hour rainfall (inches)	25-year, 24-hour rainfall (inches)	50-year, 24-hour rainfall (inches)	100-year, 24-hour rainfall (inches)
		DA	EL	P_2	P_{10}	P_{25}	P_{50}	P_{100}
01118300	Pendleton Hill Brook near Clarks Falls	4.01	348	3.53	5.20	6.48	7.66	9.06
01119500	Willimantic River near Coventry	122	701	3.20	4.44	5.34	6.15	7.08
01120000	Hop River near Columbia	74.5	607	3.25	4.51	5.41	6.23	7.16
01120500	Safford Brook near Woodstock Valley	4.17	748	3.23	4.56	5.56	6.46	7.50
01121000	Mount Hope River near Warrenville	29.0	653	3.23	4.50	5.43	6.27	7.22
01122000	Natchaug River at Willimantic	170	612	3.25	4.55	5.51	6.37	7.36
01122500	Shetucket River near Willimantic	401	621	3.25	4.51	5.44	6.28	7.24
01123000	Little River near Hanover	30.0	508	3.37	4.84	5.94	6.95	8.12
01124000	Quinebaug River at Quinebaug	156	760	3.06	4.15	4.93	5.62	6.41
01125490	Little River at Harrisville	35.7	546	3.22	4.54	5.54	6.43	7.46
01125500	Quinebaug River at Putnam	329	679	3.10	4.25	5.10	5.85	6.70
01125600	Mashamoquet Brook at Abington	11.0	686	3.28	4.70	5.79	6.77	7.91
01126000	Fivemile River at Killingly	57.8	554	3.25	4.68	5.77	6.76	7.92
01126500	Moosup River at Moosup	83.5	512	3.45	5.18	6.53	7.78	9.26
01126600	Blackwell Brook near Brooklyn	17.0	477	3.35	4.94	6.17	7.28	8.61
01127000	Quinebaug River at Jewett City	715	543	3.26	4.64	5.69	6.63	7.73
01127500	Yantic River at Yantic	89.2	409	3.43	4.76	5.74	6.62	7.63
01184100	Stony Brook near West Suffield	10.5	256	3.39	5.06	6.36	7.55	8.97
01184300	Gillette Brook at Somers	3.66	678	3.21	4.55	5.54	6.44	7.49
01184490	Broad Brook at Broad Brook	15.6	300	3.22	4.57	5.57	6.48	7.54
01184500	Scantic River at Broad Brook	97.7	389	3.22	4.58	5.60	6.53	7.61
01186500	Still River at Robertsville	85.1	1210	3.45	5.23	6.62	7.93	9.49
01187000	West Branch Farmington River at Riverton	217	1310	3.33	5.12	6.55	7.88	9.48
01187300	Hubbard River near West Hartland	20.6	1290	3.38	5.27	6.80	8.24	9.98
01187400	Valley Brook near West Hartland	7.39	1100	3.38	5.21	6.68	8.06	9.72
01187800	Nepaug River near Nepaug	23.4	844	3.67	5.53	7.00	8.36	9.99
01188000	Burlington Brook near Burlington	4.20	920	3.68	5.48	6.89	8.18	9.72
01189000	Pequabuck River at Forestville	45.7	635	3.54	5.19	6.46	7.63	9.01
01189200	Stratton Brook near Simsbury	5.44	405	3.63	5.47	6.92	8.26	9.86
01189390	East Branch Salmon Brook at Granby	39.1	506	3.41	5.17	6.57	7.87	9.43
01189500	Salmon Brook Near Granby	66.9	580	3.44	5.24	6.66	7.99	9.58
01190000	Farmington River at Rainbow	590	880	3.48	5.28	6.71	8.04	9.63
01190600	Wash Brook at Bloomfield	5.64	181	3.49	5.18	6.48	7.68	9.10
01191000	North Branch Park River at Hartford	26.5	227	3.52	5.20	6.49	7.68	9.09
01192500	Hockanum River near East Hartford	73.3	447	3.17	4.44	5.36	6.19	7.15
01192650	Roaring Brook at Hopewell	24.2	540	3.29	4.60	5.55	6.41	7.40
01192700	Mattabesset River at East Berlin	45.3	216	3.64	5.34	6.65	7.85	9.27
01192883	Coginchaug River at Middlefield	29.7	348	3.70	5.32	6.54	7.66	8.96
01193500	Salmon River near East Hampton	101	490	3.44	4.82	5.82	6.72	7.76

Appendix 2. Hydrologic characteristics for streamflow-gaging stations used in the regression analysis for Connecticut. —Continued

[Hydrologic characteristics determined using digital data sets (Connecticut Drainage Basin Boundaries, USGS Digital Elevation Models, and 24-hour rainfall from the Northeast Regional Climate Center) and GIS technology. Elevations referenced to North American Vertical Datum of 1988. mi^2, square miles; ft, foot; in., inches; DA, drainage area in square miles; EL, mean basin elevation in feet; P_X, 24-hour rainfall for x-recurrence interval in inches]

U.S. Geological Survey streamflow-gaging station		Hydrologic characteristics						
Number	Name	Drainage area (mi^2)	Mean basin elevation (ft)	2-year, 24-hour rainfall (inches)	10-year, 24-hour rainfall (inches)	25-year, 24-hour rainfall (inches)	50-year, 24-hour rainfall (inches)	100-year, 24-hour rainfall (inches)
		DA	EL	P_2	P_{10}	P_{25}	P_{50}	P_{100}
01193800	Hemlock Valley Brook at Hadlyme	2.69	362	3.50	5.02	6.17	7.20	8.42
01194000	Eightmile River at North Plain	20.2	407	3.49	4.99	6.12	7.15	8.35
01194500	East Branch Eightmile River Near North Lyme	22.4	366	3.47	5.01	6.17	7.24	8.49
01195000	Menunketesuck River near Clinton	11.3	355	3.60	5.22	6.45	7.57	8.89
01195100	Indian River near Clinton	5.62	236	3.56	5.19	6.44	7.57	8.92
01195200	Neck River near Madison	6.57	169	3.61	5.25	6.50	7.65	9.00
01196500	Quinnipiac River at Wallingford	110	303	3.61	5.24	6.50	7.65	9.00
01196580	Muddy River near North Haven	17.8	276	3.79	5.47	6.75	7.91	9.28
01196620	Mill River near Hamden	24.5	302	3.67	5.28	6.50	7.61	8.91
01196700	Wepawaug River at Milford	18.6	263	3.62	5.41	6.81	8.10	9.63
01198500	Blackberry River at Canaan	46.0	1220	3.26	4.83	6.03	7.14	8.45
01199050	Salmon Creek at Lime Rock	29.4	1170	2.95	4.28	5.30	6.22	7.30
01199200	Guinea Brook at West Woods Rd at Ellsworth	3.50	1290	3.05	4.40	5.42	6.34	7.43
01200000	Tenmile River near Gaylordsville	200	819	3.02	4.37	5.40	6.33	7.42
01201190	West Aspetuck River at Sand Rd near New Milford	23.8	787	3.17	4.52	5.54	6.45	7.52
01201500	Still River near Lanesville	67.6	538	3.77	5.22	6.28	7.22	8.32
01203000	Shepaug River near Roxbury	132	1020	3.34	4.78	5.86	6.85	8.00
01203510	Pootatuck River at Sandy Hook	25.0	510	3.82	5.30	6.37	7.34	8.44
01204000	Pomperaug River at Southbury	75.3	653	3.37	4.66	5.60	6.44	7.41
01204800	Copper Mill Brook near Monroe	2.45	490	3.77	5.35	6.53	7.60	8.85
01206000	Naugatuck River near Thomaston	71.9	1030	3.51	5.16	6.42	7.59	8.97
01206500	Leadmine Brook near Thomaston	24.5	875	3.60	5.31	6.63	7.85	9.29
01208500	Naugatuck River at Beacon Falls	260	783	3.44	4.95	6.08	7.13	8.34
01208850	Pequonnock River at Trumbull	15.5	413	3.72	5.35	6.58	7.70	9.02
01208925	Mill River near Fairfield	28.6	350	3.67	5.32	6.58	7.73	9.10
01208950	Sasco Brook near Southport	7.38	230	3.61	5.27	6.55	7.72	9.11
01208990	Saugatuck River near Redding	20.7	575	3.78	5.26	6.35	7.33	8.47
01209500	Saugatuck River near Westport	79.5	456	3.73	5.25	6.38	7.40	8.58
01209700	Norwalk River at South Wilton	29.9	478	3.71	5.25	6.39	7.43	8.63
01211700	East Branch Byram River at Round Hill	1.69	469	3.62	5.24	6.47	7.60	8.92
01212100	East Branch Byram River at Riversville	11.2	398	3.63	5.28	6.53	7.68	9.03

USGS
science for a changing world

StreamStats Data-Collection Station Report

USGS Station Number 01192500
Station Name HOCKANUM RIVER NEAR EAST HARTFORD, CT.

Click here to link to available data on NWIS-Web for this site.

Descriptive Information

Station Type	Gaging Station, continuous record
Regulated?	Undefined
Period of Record	1920-1921,1929-2001
Remarks	GAGE OPERATED AS PARTIAL-RECORD STATION FROM OCT 1971-SEP 1976. No or minimal impacts to peak flows by flood regulation.
Latitude (degrees NAD83)	41.78315
Longitude (degrees NAD83)	-72.58731
Hydrologic unit code	01080205
Local Basin	-
County	-
MCD	-
Directions to station	0.2 mi upstream from bridge on Walnut Street, 1.5 mi downstream from Hop Brook

Physical Characteristics

Characteristic Name	Value	Units	Citation Number
Contributing_Drainage_Area	73.400	square miles	31
Drainage_Area	73.400	square miles	31
Main_Channel_Blue_Line_Length	24.9	miles	55
Main_Channel_Length	23.800	miles	31
Maximum_Basin_Elevation	1070	feet	55

Mean_Basin_Elevation	447	feet	55
Mean_Basin_Slope_ft_per_ft	76.000	feet per foot	31
Shape_Factor	8.43	dimensionless	55
Minimum_Basin_Elevation	62	feet	55
Percent_Coarse_Stratified_Drift	34.23	percent	55
Percent_Forest	42.6	percent	55
Percent_Lakes_and_Ponds	1.6000	percent	31
Percent_Storage	8.9	percent	55
Percent_Wetlands	7	percent	55
Relief	1005	feet	55
Soil_Infiltration	4.7400	inches	31
Stream_Slope_10_and_85_Method	29.100	feet per mi	31
Stream_Slope_Blue_Line_Method	28	feet per mi	55
Total_Stream_Length	153.5	miles	55
Mean_Basin_Slope_from_30m_DEM	6.9	percent	55

Streamflow Statistics

Statistic Name	Value	Units	Citation Number
Peak-Flow Statistics			
1_5_Year_Peak_Flood	826	cubic feet per second	55
10_Year_Peak_Flood	2200	cubic feet per second	55
100_Year_Peak_Flood	4220	cubic feet per second	55
2_Year_Peak_Flood	1050	cubic feet per second	55
25_Year_Peak_Flood	2940	cubic feet per second	55
50_Year_Peak_Flood	3550	cubic feet per second	55
500_Year_Peak_Flood	6040	cubic feet per second	55
Mean_Annual_Flood	631.000	cubic feet per second	31
Regression_10_Year_Peak_Flood	2830	cubic feet per second	55
Regression_100_Year_Peak_Flood	5790	cubic feet per second	55
Regression_2_Year_Peak_Flood	1320	cubic feet per second	55
Regression_25_Year_Peak_Flood	3870	cubic feet per second	55
Regression_50_Year_Peak_Flood	4770	cubic feet per second	55
Regression_500_Year_Peak_Flood	11000	cubic feet per second	55
Systematic_peak_years	75	years	55
Weighted_10_Year_Peak_Flood	2260	cubic feet per second	55
Weighted_100_Year_Peak_Flood	4440	cubic feet per second	55
Weighted_2_Year_Peak_Flood	1060	cubic feet per second	55

Weighted_25_Year_Peak_Flood	3040	cubic feet per second	55
Weighted_50_Year_Peak_Flood	3700	cubic feet per second	55
Weighted_500_Year_Peak_Flood	6670	cubic feet per second	55
Flood-Volume Statistics			
1_Day_10_Year_Maximum	1495.12	cubic feet per second	31
1_Day_100_Year_Maximum	3476.10	cubic feet per second	31
1_Day_2_Year_Maximum	648.878	cubic feet per second	31
1_Day_20_Year_Maximum	1970.76	cubic feet per second	31
1_Day_25_Year_Maximum	2143.17	cubic feet per second	31
1_Day_5_Year_Maximum	1095.90	cubic feet per second	31
1_Day_50_Year_Maximum	2748.56	cubic feet per second	31
15_Day_10_Year_Maximum	512.882	cubic feet per second	31
15_Day_100_Year_Maximum	830.531	cubic feet per second	31
15_Day_2_Year_Maximum	298.336	cubic feet per second	31
15_Day_20_Year_Maximum	603.950	cubic feet per second	31
15_Day_25_Year_Maximum	633.927	cubic feet per second	31
15_Day_5_Year_Maximum	423.262	cubic feet per second	31
15_Day_50_Year_Maximum	729.783	cubic feet per second	31
3_Day_10_Year_Maximum	1022.39	cubic feet per second	31
3_Day_100_Year_Maximum	2310.54	cubic feet per second	31
3_Day_2_Year_Maximum	479.450	cubic feet per second	31
3_Day_20_Year_Maximum	1329.33	cubic feet per second	31
3_Day_25_Year_Maximum	1440.96	cubic feet per second	31
3_Day_5_Year_Maximum	765.822	cubic feet per second	31
3_Day_50_Year_Maximum	1834.48	cubic feet per second	31
30_Day_10_Year_Maximum	399.477	cubic feet per second	31
30_Day_100_Year_Maximum	580.755	cubic feet per second	31
30_Day_2_Year_Maximum	250.843	cubic feet per second	31
30_Day_20_Year_Maximum	455.224	cubic feet per second	31
30_Day_25_Year_Maximum	472.833	cubic feet per second	31
30_Day_5_Year_Maximum	340.774	cubic feet per second	31
30_Day_50_Year_Maximum	526.972	cubic feet per second	31
7_Day_10_Year_Maximum	707.311	cubic feet per second	31
7_Day_100_Year_Maximum	1371.67	cubic feet per second	31
7_Day_2_Year_Maximum	367.347	cubic feet per second	31
7_Day_20_Year_Maximum	878.562	cubic feet per second	31
7_Day_25_Year_Maximum	938.350	cubic feet per second	31
7_Day_5_Year_Maximum	554.265	cubic feet per second	31
7_Day_50_Year_Maximum	1140.73	cubic feet per second	31
Low-Flow Statistics			
1_Day_10_Year_Low_Flow	5.6740	cubic feet per second	31

1_Day_2_Year_Low_Flow	18.937	cubic feet per second	31
1_Day_20_Year_Low_Flow	3.6640	cubic feet per second	31
14_Day_10_Year_Low_Flow	26.682	cubic feet per second	31
14_Day_2_Year_Low_Flow	40.660	cubic feet per second	31
14_Day_20_Year_Low_Flow	23.201	cubic feet per second	31
3_Day_10_Year_Low_Flow	12.371	cubic feet per second	31
3_Day_2_Year_Low_Flow	26.940	cubic feet per second	31
3_Day_20_Year_Low_Flow	9.2100	cubic feet per second	31
30_Day_10_Year_Low_Flow	30.331	cubic feet per second	31
30_Day_2_Year_Low_Flow	45.836	cubic feet per second	31
30_Day_20_Year_Low_Flow	26.467	cubic feet per second	31
7_Day_10_Year_Low_Flow	21.172	cubic feet per second	31
7_Day_2_Year_Low_Flow	35.400	cubic feet per second	31
7_Day_20_Year_Low_Flow	17.780	cubic feet per second	31
7_Day_5_Year_Low_Flow	25.705	cubic feet per second	31
90_Day_10_Year_Low_Flow	35.703	cubic feet per second	31
90_Day_2_Year_Low_Flow	55.082	cubic feet per second	31
90_Day_20_Year_Low_Flow	31.137	cubic feet per second	31
Flow-Duration Statistics			
1_Percent_Duration	505.1	cubic feet per second	41
10_Percent_Duration	221	cubic feet per second	41
20_Percent_Duration	163	cubic feet per second	41
25_Percent_Duration	145	cubic feet per second	41
30_Percent_Duration	130	cubic feet per second	41
40_Percent_Duration	105	cubic feet per second	41
5_Percent_Duration	289	cubic feet per second	41
50_Percent_Duration	86	cubic feet per second	41
60_Percent_Duration	72	cubic feet per second	41
70_Percent_Duration	60	cubic feet per second	41
75_Percent_Duration	55	cubic feet per second	41
80_Percent_Duration	50	cubic feet per second	41
90_Percent_Duration	39	cubic feet per second	41
95_Percent_Duration	30	cubic feet per second	41
99_Percent_Duration	18	cubic feet per second	41
Annual Flow Statistics			
Daily_flow_years	49.000	years	31
Mean_Annual_Flow	114.000	cubic feet per second	31
Stand_Dev_of_Mean_Annual_Flow	30.900	cubic feet per second	31
Monthly Flow Statistics			
April_Mean_Flow	191.000	cubic feet per second	31
April_STD	75.900	cubic feet per second	31

August_Mean_Flow	68.700	cubic feet per second	31
August_STD	37.300	cubic feet per second	31
December_Mean_Flow	107.000	cubic feet per second	31
December_STD	55.500	cubic feet per second	31
February_Mean_Flow	136.000	cubic feet per second	31
February_STD	63.800	cubic feet per second	31
January_Mean_Flow	125.000	cubic feet per second	31
January_STD	67.700	cubic feet per second	31
July_Mean_Flow	72.700	cubic feet per second	31
July_STD	28.700	cubic feet per second	31
June_Mean_Flow	98.700	cubic feet per second	31
June_STD	41.900	cubic feet per second	31
March_Mean_Flow	201.000	cubic feet per second	31
March_STD	67.900	cubic feet per second	31
May_Mean_Flow	137.000	cubic feet per second	31
May_STD	49.200	cubic feet per second	31
November_Mean_Flow	89.800	cubic feet per second	31
November_STD	55.600	cubic feet per second	31
October_Mean_Flow	68.100	cubic feet per second	31
October_STD	41.100	cubic feet per second	31
September_Mean_Flow	72.200	cubic feet per second	31
September_STD	69.700	cubic feet per second	31
General Flow Statistics			
Average_daily_streamflow	116.569	cubic feet per second	41
Maximum_daily_flow	4300	cubic feet per second	41
Minimum_daily_flow	1.2	cubic feet per second	41
Std_Dev_of_daily_flows	108.506	cubic feet per second	41
Base Flow Statistics			
Average_BFI_value	0.551	dimensionless	53
Number_of_years_to_compute_BFI	72	years	53
Std_dev_of_annual_BFI_values	0.151	dimensionless	53
Precipitation Statistics			
24_Hour_10_Year_Precipitation	4.44	inches	55
24_Hour_100_Year_Precipitation	7.15	inches	55
24_Hour_2_Year_Precipitation	3.17	inches	55
24_Hour_25_Year_Precipitation	5.36	inches	55
24_Hour_50_Year_Precipitation	6.19	inches	55
Mean_Annual_Precipitation	46.5	inches	55
Climate Characteristics			
Mean_Annual_Snowfall	55.000	inches	31
Temperature Statistics			

Mean_Min_January_Temperature	17.000	degrees F	31

Citations

Citation Number	Citation Name and URL
31	Imported from Basin Characteristics file
41	Wolock, D.M., 2003, Flow characteristics at U.S. Geological Survey streamgages in the conterminous United States: U.S. Geological Survey Open-File Report 03-146, digital data set, available on World Wide Web at URL http://water.usgs.gov/lookup/getspatial?qsitesdd
53	Wolock, D.M., 2003, Base-flow index grid for the conterminous United States: U.S. Geological Survey Open-File Report 03–263, digital data set, available on World Wide Web at URL http://water.usgs.gov/lookup/getspatial?bfi48grd
55	Ahearn, E.A., 2004, Regression Equations for Estimating Flood Flows for the 2-, 10-, 25-, 50-, 100-, and 500-Year Recurrence Intervals in Connecticut: U.S. Geological Survey SRI 2004-5160, 62 p.

Gage Sites

1184500 Scantic River at Broad Brook

Contributing Drainage Area	100-year Precipitation	Mean Basin Elevation
98.2	7.6	389

Weighted Peak Flow	
2-yr	1100 cfs
10-yr	2400 cfs
25-yr	3350 cfs
50-yr	4190 cfs
100-yr	5160 cfs
500-yr	8110 cfs
Regression Peak Flow	
2-yr	1670 cfs
10-yr	3690 cfs
25-yr	5130 cfs
50-yr	6390 cfs
100-yr	7810 cfs
500-yr	13500 cfs
Correction Factors	
2-yr	0.658682635
10-yr	0.650406504
25-yr	0.653021442
50-yr	0.654147105
100-yr	0.660691421
500-yr	0.600740741

1206000 Naugatuck River Nr Thomaston

Contributing Drainage Area (sq mi)	100-year Precipitation (in)	Mean Basin Elevation (ft)
71	9	1038

Weighted Peak Flow	
2-yr	3120 cfs
10-yr	6600 cfs
25-yr	8930 cfs
50-yr	11100 cfs
100-yr	13600 cfs
500-yr	20300 cfs
Regression Peak Flow	
2-yr	2200 cfs
10-yr	5040 cfs
25-yr	6780 cfs
50-yr	8300 cfs
100-yr	10000 cfs
500-yr	12900 cfs
Correction Factors	
2-yr	1.418181818
10-yr	1.30952381
25-yr	1.325958702
50-yr	1.337349398
100-yr	1.36
500-yr	1.573643411

Project Site (ungaged)

Scantic River at S. Maple Street

Contributing Drainage Area (sq mi)	100-year Precipitation (in)	Mean Basin Elevation (ft)
69.7	7.6	450

Regression Results	
2-yr	1310 cfs
10-yr	2980 cfs
25-yr	4080 cfs
50-yr	5020 cfs
100-yr	6150 cfs
500-yr	10600 cfs
Corrected	
2-yr	1052 cfs
10-yr	2380 cfs
25-yr	3205 cfs
50-yr	3894 cfs
100-yr	4716 cfs
500-yr	6427 cfs

1192500 Hockanum River near East Hartford

Contributing Drainage Area (sq mi)	100-year Precipitation (in)	Mean Basin Elevation (ft)
73.4	7.2	447

Weighted Peak Flow	
2-yr	1060 cfs
10-yr	2260 cfs
25-yr	3040 cfs
50-yr	3700 cfs
100-yr	4440 cfs
500-yr	6670 cfs
Regression Peak Flow	
2-yr	1320 cfs
10-yr	2830 cfs
25-yr	3870 cfs
50-yr	4770 cfs
100-yr	5790 cfs
500-yr	11000 cfs
Correction Factors	
2-yr	0.803030303
10-yr	0.798586572
25-yr	0.785529716
50-yr	0.775681342
100-yr	0.766839378
500-yr	0.606363636

od insurance is available in this community, contact yo
nal Flood Insurance Program at (800) 638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0231F

FIRM

FLOOD INSURANCE RATE MAP

HARTFORD COUNTY,
CONNECTICUT
(ALL JURISDICTIONS)

PANEL 231 OF 675

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ENFIELD, TOWN OF	090028	0231	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
09003C0231F

EFFECTIVE DATE:
SEPTEMBER 26, 2008

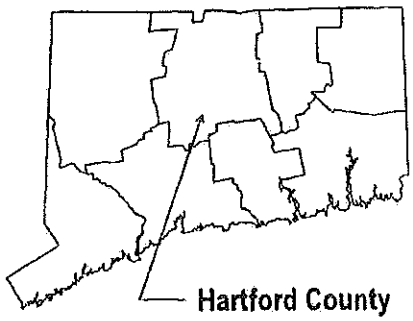
Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

FLOOD INSURANCE STUDY

VOLUME 1 OF 7

HARTFORD COUNTY, CONNECTICUT
(ALL JURISDICTIONS)



COMMUNITY NAME	COMMUNITY NUMBER
AVON, TOWN OF	090021
BERLIN, TOWN OF	090022
BLOOMFIELD, TOWN OF	090122
BRISTOL, CITY OF	090023
BURLINGTON, TOWN OF	090145
CANTON, TOWN OF	090135
EAST GRANBY, TOWN OF	090025
EAST HARTFORD, TOWN OF	090026
EAST WINDSOR, TOWN OF	090027
ENFIELD, TOWN OF	090028
FARMINGTON, TOWN OF	090029
GLASTONBURY, TOWN OF	090124
GRANBY, TOWN OF	090125
HARTFORD, CITY OF	095080
HARTLAND, TOWN OF	090146
MANCHESTER, TOWN OF	090031
MARLBOROUGH, TOWN OF	090148
NEW BRITAIN, CITY OF	090032
NEWINGTON, TOWN OF	090033
PLAINVILLE, TOWN OF	090034
ROCKY HILL, TOWN OF	090142
SIMSBURY, TOWN OF	090035
SOUTH WINDSOR, TOWN OF	090036
SOUTHINGTON, TOWN OF	090037
SUFFIELD, TOWN OF	090038
WEST HARTFORD, TOWN OF	095082
WETHERSFIELD, TOWN OF	090040
WINDSOR, TOWN OF	090041
WINDSOR LOCKS, TOWN OF	090042

EFFECTIVE:
SEPTEMBER 26, 2008

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
09003CV001A

TABLE 6- STREAMS PREVIOUSLY STUDIED BY APPROXIMATE METHODS - continued

Town of East Granby
Great Marsh
Bearverdam Marsh
Muddy Brook
South Tributary of Austin Brook
East Brook
Town of East Hartford
Tributary A to Copper Mine Brook
North Branch
Delmont Road Branch
Norwich Lane Branch
Welles Village Branch
Unnamed Tributary to Laurel Lake
Goodwin Brook
Porter Brook
Hills Pond Branch
Other isolated areas
Town of East Windsor
Scantic River
Ketch Brook
Chestnut Brook
Namerick Brook
Stoughton Brook (Masons Brook)
Broad Brook above Mill Pond
Spring Glen Brook
Other isolated areas
Town of Enfield
Boweyns Brook
Rustic Brook
Terry Brook
Scantic River
Tributary B
Tributary C
Tributaries E through K
Town of Farmington
Batterson Park Pond
Dead Wood Swamp
Lake Garda
Hyde Brook
Unnamed Tributaries
Poplar Swamp
Woodridge Lake Inlet
Town of Glastonbury
Tributary C
Tributary D
South Branch Salmon Brook
Wintergreen Brook
Cold Brook
Slab Gutter Brook
Mott Hill Brook
Dark Hollow Brook
Roaring Brook above Buckingham Reservoir
Other isolated areas
Town of Granby
Creamery Brook
Dismal Brook
Hungary Brook
West Branch of Bradley Brook
East Branch of Bradley Brook
East Fork of East Branch of Bradley Brook
City of Hartford
Cemetery Brook
Folly Brook
Kane Brook
Park River
Town of Hartland
Hogback Reservoir
West Branch Farmington River
Hubbard Brook
Valley Brook
Hurricane Brook
West Branch Salmon Brook
East Branch Farmington River
Town of Manchester
Porter Brook
Unnamed ponding and swamp areas
Town of Marlborough
Blackledge River
Dickinson Creek
Fawn Brook
Kitterfield Brook
Tributary to Fawn Hill Brook
Strong Pond
Lake Terramuggus
Unnamed swamp areas
Town of Plainville
Trout Brook
Quinnipiac River Tributary
Pequabuck River Tributary
Town of Rocky Hill
Dividend Brook
Hog Brook
Little Brook
Sawmill Brook

contends that the lake's storage capacity is such that the drainage above the lake will not influence the discharges downstream.

In the Town of East Windsor, two gaging stations, one on the Scantic River and another on Broad Brook, both within the study limits, were the principal sources of data for defining discharge-frequency relationships for these two watercourses. The Scantic River gage was operated for 43 years until 1971, while the Broad Brook gage had begun operations in 1961. Values of the 10-, 2-, 1-, and 0.2-percent-annual-chance peak discharges were obtained from a log-Pearson Type III analysis of annual peak flow data (Water Resources Council, 1976).

Frequency discharge data for additional points on Broad Brook and the Scantic River were derived by comparison with the gages' information using a discharge-drainage area ratio formula:

$$Q_1/Q_2 = (A_1/A_2)^{0.75}$$

Where Q_1 and Q_2 are the discharges at specific locations and A_1 and A_2 are drainage areas at these locations (D. Johnstone and W. P. Cross, 1949).

In the Town of Enfield, for the 1979 FIS, the source of data for defining the discharge-frequency relationships for Beeman's Brook, Buckhorn Brook, Freshwater Brook, Grape Brook, Jawbuck Brook, and Tributary A to Freshwater Brook were regional equations prepared by the USGS (U.S. Department of the Interior, Flood Flow Formulas, 1977). These regional equations relate streamflow to the parameters of drainage area, main channel slope, and mean annual precipitation. The 10-, 2-, and 1-percent-annual-chance peak flows at several stations on each stream were calculated from the regional equations. The 0.2-percent-annual-chance discharge at each station was extrapolated from a log normal plot of the three calculated flow values.

For the June 17, 2002, revision, the regression equations used in the Terry Brook analysis were published in Connecticut Water Resources Bulletin No. 36 from the USGS (U.S. Department of the Interior, 1983). A regression equation was not available for the 0.2-percent-annual-chance floods; therefore the flood peaks were extrapolated from the 2- to 1-percent-annual-chance data. The rainfall values used in the regression equations were obtained from "Areal Rainfall Maps for Connecticut" included in a USGS paper entitled "Flood Flow Formulas for Urbanized and Nonurbanized Areas of Connecticut" (L. A. Weiss, 1975).

Data on the stream length and channel slopes were obtained from 1:24,000 scale USGS quadrangle maps (U.S. Geological Survey, 1964, et cetera) and topographic mapping for the Town of Enfield (1991). The percent stratified drift within the watersheds was obtained from "Water Resources Inventory of Connecticut, Part 7, Upper Connecticut River Basin" (U.S. Geological Survey, 1981).

The procedures in USGS Water Supply Paper 2207, "Flood Characteristics of Urban Watersheds in the United States" (U.S. Geological Survey, 1983), were

TABLE 10 – SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
SANDY BROOK					
At New Britain/Newington corporate limits	1.92	*	*	1,100	*
SCANTIC RIVER					
At confluence with the Connecticut River	114.00	2,865	6150	8,130	15,660
Gage located at Route 191	98.20	2,500	5,500	7,430	14,000
Below Broad Brook	97.60	2,390	5,265	7,110	13,395
SCHULTZ POND BROOK					
At confluence with Willow Brook	2.24	*	*	250	*
SCOTT SWAMP BROOK					
At confluence with the Pequabuck River	4.00	285	560	755	1,450
At Industrial Park	2.80	200	390	530	1,000
At State Route 177	1.70	130	255	345	680
SMITH BROOK					
At confluence with Meadow Drain Brook	1.85	255	450	560	890
Upstream from Tributary B	1.01	155	280	345	550
SOUTH BRANCH LYDALL BROOK					
At its confluence with Lydall Brook	#	77	187	225	409
SOUTH BRANCH PARK RIVER-TROUT BROOK					
At the conduit entrance, approximately 400 feet upstream of Park Avenue	45.00	4,350	7,890	10,020	14,650
Upstream of confluence of Cemetery Brook	40.50	3,930	7,100	9,040	13,270
Upstream of confluence of Piper Brook	19.90	2,600	4,750	6,180	9,360
Upstream of confluence of Rockledge Brook	16.20	1,720	3,210	4,240	6,700
Upstream of confluence of East Branch Trout Brook	12.70	650	1,350	1,850	3,230

*Data not available
#Not applicable split flow

GM2 Associates

Engineers • Inspectors • Surveyors

Job _____ Computed By _____ Date _____

Description South Maple ST Bridge Checked By _____ Date _____

_____ Sheet ____ of ____

FIS Flows @ Subject location For FIS

$$Q_1/Q_2 = \left(A_1/A_2\right)^{0.75}$$

Say Q_1 & A_1 are for Subject bridge
Q_2 & A_2 " " Gauge

FIS P. 89

		10	50	100	500	
Gauge @ RTE 191	Q_2 =	2600	5500	7430	14000	A_2 = 98.20 sm
∴ Flows @ Subject bridge	Q_1 =	1932	4251	5743	10822	A_1 = 69.7 sm

$\left(\frac{A_1}{A_2}\right)^{0.75} = 0.773$

★ FEMA FLOW DERIVATION FROM AREA/DISCHARGE RELATIONSHIP
FOR INFORMATIONAL PURPOSES ONLY.
SITE STUDIED BY APPROXIMATE METHODS.
NO REGULATED FLOW RATE.

XIW-10-02

GEOTECHNICAL INVESTIGATION
PROPOSED REPLACEMENT OF
SOUTH MAPLE STREET BRIDGE OVER
SCANTIC RIVER
ENFIELD, CONNECTICUT

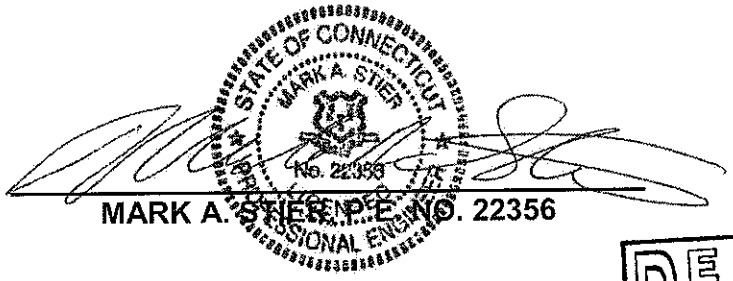
PREPARED FOR:

TOWN OF ENFIELD
PUBLIC WORKS COMPLEX
40 MOODY ROAD
ENFIELD, CONNECTICUT 06082

PREPARED BY:

TECTONIC ENGINEERING & SURVEYING CONSULTANTS P.C.
70 PLEASANT HILL ROAD
MOUNTAINVILLE, NEW YORK 10953

SEPTEMBER 1, 2005
REVISED DECEMBER 17, 2009



MARK A. STIER, P.E. NO. 22356

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GEOTECHNICAL INVESTIGATION
PROPOSED REPLACEMENT OF
SOUTH MAPLE STREET BRIDGE OVER
SCANTIC RIVER
ENFIELD, CONNECTICUT

TABLE OF CONTENTS

1.0 INTRODUCTION

In accordance with the request and authorization of the Town of Enfield, Connecticut, Tectonic Engineering & Surveying Consultants, P.C. has performed a subsurface investigation and geotechnical engineering analysis for the proposed roadway improvements and replacement of the South Maple Street Bridge over the Scantic River. This report presents the scope of the investigation, findings, conclusions, and recommendations for design and construction of the proposed replacement bridge.

2.0 SCOPE OF WORK

The geotechnical engineering services described below were performed for the Town of Enfield, herein referred to as Client.

- Performance of seven test borings to identify the subsurface conditions in the area of the roadway improvements and abutments of the replacement bridge.
- Field inspection of the borings by an engineering geologist, which included locating the borings on-site, logging of subsurface soil, bedrock and groundwater conditions and collection of soil and bedrock samples for laboratory testing.
- Laboratory testing of selected soil samples to confirm field identification of the soils and to assist in identifying the engineering properties of the soils.
- Compilation and geotechnical engineering analysis of the subsurface conditions as related to the design and construction of the replacement bridge foundations and pavement design.
- Preparation of this engineering report presenting the results of the subsurface investigation and geotechnical recommendations for the design and construction of the foundations of the replacement bridge.

3.0 SITE AND PROJECT DESCRIPTION

The project site is located along South Maple Street between Powder Hill Road and Dust House Road in the Town of Enfield, Hartford County, Connecticut. Currently, South Maple Street consists of a two-lane asphalt paved roadway, with a single-lane 66-foot single span steel bridge which crosses the Scantic River. Overhead and buried utilities are present parallel to the roadway alignment. A historic barn and a pump station are located along the roadway north of the existing bridge. The areas directly adjacent to the

existing bridge consist of partially wooded slopes leading downward towards the Scantic River. Currently, the bridge surface is relatively level, at an elevation of approximately +80 feet across the entire span.

It is our understanding that the proposed construction includes removal of the existing single-lane bridge and reconstruction of a new double-lane bridge. It is also our understanding that the new bridge will be approximately 51 feet wide and have a single span on the order of +75 to +80 feet. The foundations for the abutments for the new bridge are anticipated to bear at about Elevation +60 feet and consist of reinforced concrete. Wing walls are proposed on both sides of each abutment to maintain the elevation of the bridge deck for the proposed width. Reconstruction of the existing asphalt-concrete pavements along South Maple Street is anticipated to consist of removal of the existing pavement section and construction of a new pavement section.

4.0 SUBSURFACE INVESTIGATION

The subsurface investigation consisted of the drilling of seven test borings, designated B-1 through B-7. It should be noted that B-3 required two attempts to achieve the proposed depth, with the second attempt labeled B-3A. The borings were located along the existing roadway, at the locations shown on the attached Boring Location Plan, Figure 1.

The borings were performed by General Borings, Inc. from July 18th through 20th, 2005 utilizing a drill rig mounted to a CASE 580E backhoe. The borings were advanced through soil and highly weathered bedrock materials utilizing 3-1/4 inch I.D. hollow stem augers. At the locations of the proposed bridge abutments, bedrock was core sampled with an NQ-size core barrel. Standard Penetration Testing (SPT) utilizing a split-spoon sampler, was performed continuously to a depth of 6 feet unless cobbles and boulders were encountered, and at 5-foot intervals thereafter.

All drilling and sampling operations were monitored on a full-time basis by an engineering geologist representing Tectonic. The engineering geologist also prepared logs of the encountered soil, bedrock and groundwater conditions. Copies of the boring logs are attached.

5.0 LABORATORY TESTING

Laboratory testing was performed on select soil samples to confirm field identification and aid in establishing the engineering properties of the soil. Testing included three gradation analyses performed in accordance with the procedures of ASTM D422. The results of the laboratory testing are attached.

6.0 SUBSURFACE CONDITIONS

The results of the investigation indicate that the subsurface conditions consist of a variably thick layer of existing fill overlying native gravelly, silty sand soils which in turn overlies sandstone bedrock. Within paved areas, a 4 to 6 inch thick layer of asphalt concrete was encountered overlying a gravel subbase. General descriptions of the encountered soil, bedrock and groundwater conditions are provided below. More detailed descriptions are provided on the attached boring logs.

6.1 Existing Fill

Existing fill was encountered to various depths within each of the borings performed. The fill was found to be the between 2 and 3 feet thick at borings B-2, B-6, and B-7, approximately 10 feet thick at borings B-1 and B-5, and 13 to 14 feet thick at borings B-3 and B-4. At locations off the existing roadway (B-1, B-2, B-5, and B-6), the fill consists of brown sand silty sand with minor amounts of gravel. Beneath the roadway (borings B-3, B-4, and B-7), the fill was observed to consist of a tan medium to fine sand with trace amounts of silt and gravel. Based on observations made during drilling, boulders and cobbles are likely present within the fill. The fill may also contain debris not recovered by the split-spoon sampler. Standard Penetration Test (SPT) blow counts in the fill ranged from 4 to 23 blows per foot (bpf). These blow counts indicate that the fill is in a loose to medium

dense condition; however, SPT blow counts were typically below 10 bpf, indicating a loose condition.

6.2 Native Soils

The native soils were observed to consist primarily of reddish-brown coarse to fine sand with gravel and trace amounts of silt. SPT blow counts within the native soils ranged from 10 to over 100 blows per foot, indicating medium dense to very dense conditions, and the presence of cobbles or boulders. The native soil appears to consist of sandstone bedrock weathered to a soil-like condition. The presence of cobbles and boulders was also indicated by difficulty experienced during the advancement of the augers.

6.3 Bedrock

Bedrock was encountered at all of the borings performed at the site, except B-1 and B-2. Bedrock was encountered in a weathered condition at the elevations indicated below:

Boring #	Bedrock Elevation (ft)
B-3	+67
B-4	+66
B-5	+64
B-6	+69
B-7	+75

The bedrock was observed to consist of a red-brown, slightly weathered to fresh, slightly to moderately fractured, medium grained, hard sandstone. Fracture planes were generally observed to be dipping between 0 and 20 degrees from the horizontal, with an exception occurring at an approximate depth of 18.5 feet at boring B-6, where a fracture plane was observed to be dipping at an angle approximately 50 degrees from the horizontal. The recovery of the core samples obtained was generally over 90 percent, and the rock quality designations (RQD's)

of the core samples generally ranged from 35 to 73 percent, indicating poor to fair rock mass conditions.

An exception to the relatively good recovery and RQD's occurred within the core sample attempted from a depth of 20 feet to 24 feet at boring B-3A, where the sample recovery consisted of an 8-inch piece of sandstone similar to that described above, and an approximately 14-inch piece of twisted metal, which may have fallen into the drill hole from the existing fill layer encountered overlying the bedrock. The subsequent core resulted in competent sandstone bedrock. The depth of auger resistance encountered at both borings B-3 and B-3A support the possibility that the metal recovered in the core from a depth of 20 feet to 24 feet at boring B-3A likely fell into the borehole from the existing fill layer overlying the bedrock at this location.

6.4 Groundwater

Within the borings performed to depths below the proposed foundations, accurate groundwater measurements could not be obtained due to the introduction of water to the borehole during coring. The shallower borings did not encounter groundwater within the depths explored. The static groundwater table at the site is anticipated to be strongly influenced by the water level within the Scantic River. Due to the close proximity of the borings and proposed abutments to the river and the sandy nature of the site soils, the groundwater level at these locations can be expected to roughly coincide with the water level in the river (approximately Elevation +64 feet). Consequently, groundwater should be expected to be at higher elevations at other times and to roughly coincide with the design flood elevation.

7.0 DISCUSSION AND CONCLUSIONS

Based on the results of our subsurface investigation, construction of the proposed bridge abutments, retaining walls, and pavement rehabilitation are feasible from a geotechnical

standpoint provided the recommendations provided herein are incorporated into the design and construction. In general, the following conclusions were made:

- Conventional shallow spread footings bearing on bedrock may be used to support the bridge abutments and retaining walls. Cobbles and boulders should be anticipated when excavating for the abutment and retaining wall foundations.
- Construction of the foundations will likely require the excavation of competent sandstone bedrock. Observations made during drilling indicate that the depth to which the bedrock can be excavated using conventional ripping techniques could be limited, and additional means (such as drilling and blasting) could be necessary.
- Some of the existing fill and native soil may be suitable for use as structural fill; however, additional laboratory testing should be performed during the construction phase prior to approval for use.
- Groundwater should be anticipated to be encountered during foundation excavation based on the water level within the Scantic River at the time of construction. Cofferdams and dewatering will likely need to be implemented during construction.

8.0 RECOMMENDATIONS

The following subsections provide our recommendations for design and construction of the proposed abutments, retaining walls, and pavements. These recommendations are based on the results of the subsurface investigation, our understanding of the proposed construction, as previously described, and our general experience in the area of the proposed construction.

8.1 Foundations

The bridge abutments should be supported on conventional shallow foundations bearing on sound bedrock encountered at elevations ranging from approximately +64 to +69 feet at borings B-4, B-4A, B-5, B-6, and B-7. The depth to bedrock may vary significantly at locations away from the borings. The foundations for the proposed wing walls may be stepped to bear on the native soil. The foundations should also bear a minimum depth of 4 feet below the proposed finish grade adjacent to the abutment and retaining walls for protection against frost penetration.

Foundations bearing on the sandstone bedrock should be designed for a net allowable bearing capacity not to exceed 10 tons per square foot (tsf), based on a foundation width of 12 feet. Foundations bearing on native soil should be designed for a net allowable bearing capacity of 2 tsf. Both bearing capacities was derived using a Factor of Safety of 3. The net allowable bearing capacity is equal to the net ultimate bearing capacity divided by the Factor of Safety. Therefore, the net ultimate bearing capacity of the sandstone bedrock and native soil was evaluated to be 30 tsf and 6 tsf, respectably. All footing subgrades should be inspected by the geotechnical engineer. Subgrade preparation should be as specified in Section 9.0.

Based on the anticipated loading and bearing conditions, the total settlement of the abutment and retaining wall foundations should be less than 1 inch, and differential settlements should be less than ½ inch over a 30 foot length.

8.2 Design to Resist Lateral Loading

The abutments and retaining walls should be designed in accordance with the following lateral earth pressure criteria:

Lateral Earth Pressure Design Criteria	
Soil Parameter	Structural Backfill (level)
Angle of Internal Friction (degrees)	34
Active Earth Coefficient (Ka)	0.28
At rest earth pressure coefficient (Ko) (restrained wall)	0.44
Total Unit Weight of Soil (pounds per cubic foot) [1]	125
[1] Assumes no hydrostatic pressure build-up behind retaining wall.	

The design of the abutment and retaining walls should incorporate the appropriate surcharge loading due to compaction of backfill and construction vehicle traffic. Design to resist sliding should incorporate a sliding coefficient of 0.60 for concrete cast directly against the sandstone bedrock and 0.35 for concrete cast against soil. It is recommended that passive resistance not be utilized to resist sliding.

The groundwater level for design should be assumed to coincide with the design flood elevation. The buoyant weight of concrete should be utilized below this elevation.

8.3 Pavements

The native soils and existing fill encountered within the borings are generally suitable for support of the proposed pavements, provided the recommendations contained in Section 9 of this report are incorporated into design and construction. Based on the results of our subsurface investigation, the subgrade conditions underlying the existing roadway generally consist of loose to medium dense fill soil overlying native soil and bedrock. Given these conditions, we recommend that flexible pavements be designed utilizing a CBR of 10.

The subgrade should be prepared as discussed in Section 9. The subgrade should be proofrolled under the observation of the geotechnical engineer. Any soft, wet areas or areas found to be unstable under the weight of a 10-ton roller should be removed and replaced with compacted structural fill.

8.4 Drainage

Weep holes or other drainage provisions should be provided to prevent the buildup of groundwater and stormwater behind the abutments and retaining walls. A zone of free-draining crushed stone should be utilized directly behind the retaining walls for a distance at least 12 inches from the inside face of the retaining wall.

8.5 Seismic Design and Liquefaction Potential

As part of our investigation, we have evaluated an appropriate site coefficient for use in seismic design. Based on the results of our subsurface investigation and the criteria outlined in Section 3.10.5 of the AASHTO LRFD Bridge Design Specifications, the subsurface soils underlying the proposed bridge abutments and wing walls should be considered Soil Profile Type I with a corresponding site coefficient (S) of 1.0.

Liquefaction of soils can be caused by a strong vibratory motion due to earthquakes. Both research and historical data indicate that loose, granular soils saturated by a shallow groundwater table are most susceptible to liquefaction. Liquefaction occurs when an earthquake and associated ground shaking of sufficient duration results in the loss of grain-to-grain contact due to a rapid increase in pore water pressure, causing the soil to behave as a fluid for short periods. Based on the results of our borings and SPT sampling, the subsurface conditions at the site should be considered as having a low potential for liquefaction. This is due to the presence of shallow bedrock.

8.6 Scour Potential

The potential for scour of the native soils at the site should be performed assuming at D50 value of 1 mm or approximately 0.04 inches. The bedrock was evaluated for scour potential using the Erodibility Index Method as described in the publication "Evaluating Scour at Bridges, Fourth Edition", Publication No. FHWA NHI 01-001, Hydraulic Engineering Circular No. 18, dated May 2001 by the U.S. Department of Transportation Federal Highway Administration. The Erodibility Index Method estimates the stream power required to cause erosion of bedrock based on erodibility characteristics of the bedrock. The stream power required to cause erosion is compared to the stream power anticipated during design high flow events (floods) to evaluate if those events may cause erosion of the bedrock.

The results of our analysis indicate that the bedrock at the site is erosion resistant up to a stream power of approximately 10.2 kW/m^2 (109.8 kW/ft^2). Our review of the hydraulic analyses for a 500-year flood event indicate that the corresponding stream power will be approximately 3.3 kW/m^2 (35.5 kW/ft^2) at the abutment locations. Based on the results of our analyses, it is anticipated that foundations bearing on the bedrock, as recommended in this report, will not be subject to scour under the 500-year flood event.

9.0 EARTHWORK AND CONSTRUCTION CRITERIA

The following sections present our recommendations regarding earthwork, excavations, and construction monitoring.

9.1 General Site Preparation

Initially the site should be cleared of the existing bridge structure, asphalt and concrete and other surface and subsurface obstructions and stripped of trees, and other vegetation. Topsoil and subsoils that contain appreciable amounts of organic materials should be stripped and stockpiled separately for re-use, if warranted. Debris and vegetation from the clearing operations should be removed from the site and disposed of at a legal dump site. Existing utilities within the project limits should be re-routed or protected from damage by construction equipment.

9.2 General Excavation

All excavations should conform to the latest OSHA requirement regarding worker safety. The fill and native soils at the site have the OSHA designation of "Type C" soils. If required, all shoring and bracing should be designed by a professional engineer. Any vertical cut (in soil) more than 4 feet in height should be sloped back for safety unless sheeting or a bracing system is used. OSHA requirements pertaining to worker safety should be met during excavation, dewatering, and backfilling activities.

9.3 Foundation Subgrade Preparation

Foundation subgrades should be prepared by removing all soil and rock particles loosened by machine excavation. The foundation subgrades should consist of sound sandstone bedrock with no fracture or bedding planes located beneath footings which may result in an unstable condition. Zones of soil or bedrock weathered to a soil condition should be removed from beneath the foundations. The area of removal should be within the zone of influence of the foundation. The zone of influence is defined as an imaginary line sloping down and outwards from the outside edge of the foundation at a 1 horizontal to 1 vertical slope.

The foundation subgrade should be inspected by a geotechnical engineer prior to concrete or rebar placement. Any areas deemed unsuitable by the geotechnical engineer should be removed and replaced with lean concrete having a minimum 28-day unconfined compressive strength of 2,000 psi. Lean concrete may also be used to level off foundation excavations that become uneven due the irregularities in the bedrock surface.

9.4 Pavement Subgrade Preparation

The native soils and existing fill are generally considered suitable for support of the proposed asphalt concrete pavements provided all debris, topsoil, organic materials and soft soils are stripped from the surface, and the subgrade is proofrolled under the observation of a geotechnical engineer. Any areas found to be soft, wet, or unstable under the weight of a 10-ton roller should be removed and replaced with compacted structural fill. A geotechnical engineer should be on-site to observe proofrolling and approve subgrades prior to construction of the pavement section.

9.5 Dewatering and Protection of Subgrades

Cofferdams should be constructed to divert water from entering the area of the proposed abutments and retaining walls. The design of the cofferdams should be as needed to prevent the flow of water into the foundation subgrade. Dewatering

should be performed to maintain the water level a minimum 2 feet below the deepest excavation. Methods such as placing multiple sumps outside the foundation excavation may be practical. Sumping directly in the foundation excavation should not be performed. Perched groundwater flowing toward the excavation from the uphill direction should be intercepted prior to entering the subgrade.

All subgrades should be protected from the effects of frost, construction traffic, groundwater, and surface water. The necessary protection should be provided immediately subsequent to excavation and be maintained until placing concrete, fill or the pavement subbase. Temporary surface drainage measures are recommended to divert runoff away from the proposed construction limits.

9.6 Structural Fill Material and Placement Requirements

The bridge abutment backfill should be Pervious Structure Backfill placed and compacted in accordance with the requirements presented within Section 2.16 of the ConnDOT Standard Specifications. The Pervious Structure Backfill should be compacted to at least 100 percent of the maximum dry density as determined by AASHTO T180, Method D. The lift thickness will vary depending on the type of compaction equipment used; however, fill should be placed in uniform horizontal lifts not exceeding 6 inches in depth after compaction. Special attention should be given to compaction of the Pervious Structure Backfill in places close to walls. Within 5 feet of the back face of the abutment walls, each lift shall be compacted by mechanical rammers, vibrators, or pneumatic tampers.

Fill placement for remediation of the existing unsuitable materials underlying the proposed pavements should consist of compacted granular fill placed and compacted in accordance with the requirements presented within Section 2.14 of the ConnDOT Standard Specifications. The compacted granular fill should be compacted to at least 95 percent of the maximum dry density as determined by AASHTO T180, Method D. The lift thickness will vary depending on the type of

compaction equipment used; however, the fill should be placed in uniform horizontal lifts not exceeding 8 inches in loose depth (prior to compaction).

9.7 Rock Excavations

Based on the results of our subsurface investigation, it appears that the majority of the continuous footing for the proposed abutments and retaining walls will be constructed at depths below the existing bedrock surface. Based on the rock encountered during the borings, we anticipate that conventional heavy ripping techniques will be feasible through portions of the upper exposures of weathered rock (2 to 4 feet).

Excavation of rock should proceed in a manner that will minimize damage to underlying bedrock, which will serve as the foundation subgrade. Where feasible, rock excavation should be performed by ripping techniques. Where ripping of the rock is not feasible, controlled blasting or hoe-ramming techniques should be implemented. In the event that blasting is required, blasting techniques should be employed that minimize over-breakage at the foundation subgrades. Blasting operations should also be conducted in a manner that will minimize ground vibrations at adjacent structures, and also limit the amount of air overblast pressure.

If blasting is necessary, we recommend that a blast monitoring program be implemented to control blasting through limitations on charges per round, charges per delay, peak particle velocities, and maximum level of air overblast pressures at adjacent structures. In addition, blasting mats should be utilized to minimize the hazard of fly-rock to adjacent structures and to personnel on-site. A qualified contractor licensed and insured for use of explosives should perform any rock excavation requiring use of drill and blast techniques. If there is to be a separate payment for soil and rock excavation, specific criteria should be established. We recommend that the bid documents be clear regarding the definition of rock and methods of measurement of rock.

10.0 CONSTRUCTION MONITORING

A geotechnical engineer familiar with the existing subsurface conditions and having the appropriate laboratory and field testing support should be engaged by the owner to observe that all earthwork is performed in accordance with the specifications, applicable codes, and the design criteria provided in this report.

The following work should be performed under the observation of the geotechnical engineer:

- Dewatering/water diversion (cofferdam construction)
- Remedial Removals
- Rock Excavation
- Blasing (if necessary)
- Subgrade preparation
- Placement and compaction of backfill
- Paving operations

Materials proposed for use as structural fill should be tested and approved prior to delivery or use on-site. All fill materials should be tested as they are being placed to verify that the required compaction is being achieved.

11.0 LIMITATIONS

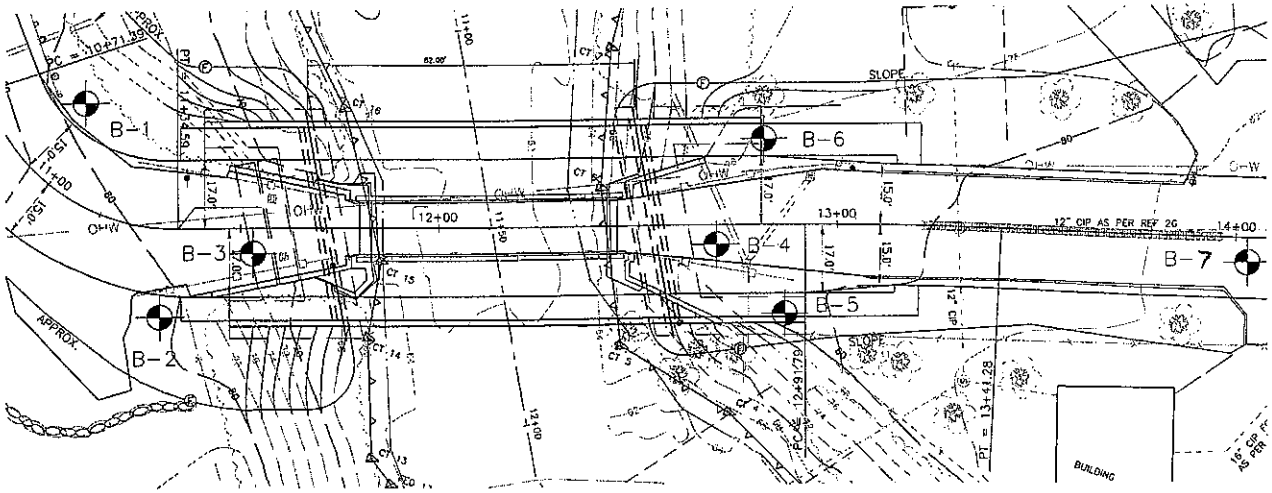
Our professional services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical engineers and geologists practicing in this or similar situations. The interpretation of the field data is based on good judgment and experience. However, no matter how qualified the geotechnical engineer or detailed the investigation, subsurface conditions cannot always be predicted beyond the points of actual sampling and testing. No other warranty, expressed or implied, is made as to the professional advice included in this report.

The recommendations contained in this report are intended for design purposes only. Contractors and others involved in the construction of this project are advised to make an independent assessment of the soil, bedrock and groundwater conditions for the purpose of establishing quantities, schedules and construction techniques.

This report has been prepared for the exclusive use of The Town of Enfield for the specific application to the proposed replacement of the South Maple Street Bridge over the Scantic River, located in the Town of Enfield, Hartford County, Connecticut. In the event that any changes in the design or location of the proposed structures are planned, Tectonic Engineering and Surveying Consultants P.C. (Tectonic) shall not consider the conclusions and recommendations contained in this report valid unless reviewed and verified in writing. It is further recommended that Tectonic be retained to provide construction monitoring and inspection services to ensure proper implementation of the recommendations contained herein, which would otherwise limit our professional liability.

FIGURE 1

N



LEGEND

B-1 APPROXIMATE BORING LOCATION

NOTES

1. BORING LOCATION PLAN BASED ON SITE SURVEY DRAWING PREPARED BY TECTONIC.
2. BORING LOCATIONS WERE DETERMINED ON-SITE BY MEASURING FROM EXISTING SITE FEATURES.
3. BORING B-3A WAS PERFORMED WITHIN CLOSE PROXIMITY TO BORING B-3, AND IS NOT SHOWN ON THIS PLAN FOR CLARITY.

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BORING LOCATION PLAN

TOWN OF ENFIELD
REPLACEMENT OF SOUTH MAPLE STREET
BRIDGE OVER SCANTIC RIVER
ENFIELD, CONNNECTICUT

Date	Work Order	Drawing No.	Rev
8/26/05	2833.00	FIGURE 1	0
Scale 1"=30'			

APPENDIX I

TECTONIC *ENGINEERING & SURVEYING CONSULTANTS P.C.*

PROJECT No. **2833.00**

PROJECT: **So. Maple Street Bridge Rehabilitation**

LOCATION: **Enfield, CT**

BORING No. B-1

SHEET No. 1 of 1

CLIENT: **Town of Enfield**

CONTRACTOR: **General Borings, Inc.**

METHOD OF ADVANCING BORING	DIA.	DEPTH
POWER AUGER:	3 1/4"	0 TO 8'
ROT. DRILL:		TO
CASING:		TO
DIAMOND CORE:		TO

RIG/HAMMER TYPE: Case/winch-safety

GROUND WATER	DATE	TIME	DEPTH
	7/20/05		NE

MON. WELL ☐ YES ☒ NO

SCREEN DEPTH: --- TO ---

WEATHER: **Clear** TEMP: **85° F**

DEPTH TO ROCK: **Not Encountered***

*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Sara Jansyn**

DRILLER: **Rick Posa**

SURFACE ELEVATION: **80.0**

DATUM: **See Remarks**

DATE START: **7/20/05**

DATE FINISH: **7/20/05**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ⊖ 1 2 3 4 5

PLASTIC LIMIT % × — WATER CONTENT % ⊗ — LIQUID LIMIT % △

10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	6	1 2 4 5	S-1	12		M	SP-SM	Tn c-f SAND, little f Gravel, trace Silt (Possible FILL)		
3	15	5 8 7 4	S-2	12		M	SM	Rd-bwn c-f SAND, and c-f Gravel, little Silt		
5	5	5 2 3 4	S-3	14		M	SM	Bwn c-f SAND, some f Gravel, some Silt		75.0
9	17	5 6 11 61	S-4	10		M	SM	Same		70.0
10								End of Boring at 10'		
										65.0
										60.0
										55.0

REMARKS: Surface elevation estimated based on site survey drawing prepared by Tectonic.

BORING LOG 2833-00.GPJ TECTONIC ENG.GDT 8/21/09

TECTONIC *ENGINEERING & SURVEYING CONSULTANTS P.C.*

PROJECT No. **2833.00**

PROJECT: **So. Maple Street Bridge Rehabilitation**

LOCATION: **Enfield, CT**

BORING No. B-2

SHEET No. 1 of 1

CLIENT: **Town of Enfield**

CONTRACTOR: **General Borings, Inc.**

METHOD OF ADVANCING BORING	DIA.	DEPTH
POWER AUGER:	3 1/4"	0 TO 10'
ROT. DRILL:		TO
CASING:		TO
DIAMOND CORE:		TO

RIG/HAMMER TYPE: Case/winch-safety

GROUND WATER	DATE	TIME	DEPTH
	7/20/05		NE

MON. WELL ☐ YES ☒ NO

SCREEN DEPTH: --- TO ---

WEATHER: **Clear** TEMP: **85° F**

DEPTH TO ROCK: **Not Encountered'**

*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Sara Jansyn**

DRILLER: **Rick Posa**

SURFACE ELEVATION: **80.0**

DATUM: **See Remarks**

DATE START: **7/20/05**

DATE FINISH: **7/20/05**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5

PLASTIC LIMIT % × — WATER CONTENT % ⊗ — LIQUID LIMIT % △ 10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	6	1 2 4 9	S-1	16		M	SM	Bwn c-f SAND, and Silt, little f Gravel (some organics) (Possible FILL)		
3	24	16 11 13 14	S-2	6		M	SM	Rd-bwn c-f SAND, some Silt, ittle f Gravel		
5								Augered through Cobbles 4'-5'		75.0
6	10	6 5 5 7	S-3	2		M	SM	Rd-bwn c-f SAND, and c-f Gravel, trace Silt		
11	13	6 6 7 13	S-4	8		M	SM	Rd-bwn c-f SAND, some Silt, little f Gravel		70.0
12								End of Boring at 12'		
										65.0
										60.0
										55.0

REMARKS: Surface elevation estimated based on site survey drawing prepared by Tectonic.

BORING LOG 2833-00.GPJ TECTONIC ENG.GDT 8/21/09

TECTONIC *ENGINEERING & SURVEYING CONSULTANTS P.C.*

PROJECT No. **2833.00**

PROJECT: **So. Maple Street Bridge Rehabilitation**

LOCATION: **Enfield, CT**

BORING No. B-3

SHEET No. 1 of 1

CLIENT: **Town of Enfield**

CONTRACTOR: **General Borings, Inc.**

METHOD OF ADVANCING BORING	DIA.	DEPTH
POWER AUGER:	3 1/4"	0 TO 22'
ROT. DRILL:		TO
CASING:		TO
DIAMOND CORE:		TO

RIG/HAMMER TYPE: Case/winch-safety

GROUND WATER	DATE	TIME	DEPTH
	7/18/05	11:00 am	NE

MON. WELL ☐ YES ☒ NO

SCREEN DEPTH: --- TO ---

WEATHER: **Clear** TEMP: **80° F**

DEPTH TO ROCK: **13'**

*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Sara Jansyn**

DRILLER: **Rick Posa**

SURFACE ELEVATION: **80.0**

DATUM: **See Remarks**

DATE START: **7/18/05**

DATE FINISH: **7/18/05**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % 10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.) 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1								4" Asphalt Concrete Pavement		
2	20	11 14 6 5	S-1	10		M	SM	Rd-bwn c-f SAND, some f Gravel, little Silt (FILL)		
3										
4	4	4 2 2 2	S-2	12		M	SP-SM	Tn m-f SAND, little f Gravel, trace Silt (FILL)		
5										75.0
6	7	2 4 3 11	S-3	8		M	SP-SM	Same (FILL)		
7										
8										
9										
10										70.0
11	7	3 3 4 50/4	S-4	20		M	SM	1/2 inch layer organics at 10' Bwn c-f SAND, little Silt, scattered roots, steams		
12										
13										
14										
15	100+	100/5	S-5	4		M	GM	Rd-bwn c-f GRAVEL, and c-f Sand, little Silt (completely weathered bedrock)		65.0
16										
17										
18										
19										
20	100+	100/3	S-6	2		M	SM	Rd-bwn c-f SAND, some f Gravel, little Silt (Completely weathered bedrock)		60.0
21										
22								Auger Refusal @ 22'		
23								End of Boring at 22'		
24										
25										55.0

REMARKS: Surface elevation estimated based on site survey drawing prepared by Tectonic.

BORING LOG 2833-00.GPJ TECTONIC ENG.GDT 8/21/09

TECTONIC *ENGINEERING & SURVEYING CONSULTANTS P.C.*

PROJECT No. **2833.00**

PROJECT: **So. Maple Street Bridge Rehabilitation**

LOCATION: **Enfield, CT**

BORING No. B-3A

SHEET No. 1 of 2

CLIENT: **Town of Enfield**

CONTRACTOR: **General Borings, Inc.**

METHOD OF ADVANCING BORING	DIA.	DEPTH
POWER AUGER:	3 1/4"	0 TO 20'
ROT. DRILL:		TO
CASING:		TO
DIAMOND CORE:	2"	20 TO 30'

RIG/HAMMER TYPE: Case/winch-safety

GROUND WATER	DATE	TIME	DEPTH

MON. WELL ☐ YES ☒ NO

SCREEN DEPTH: --- TO ---

WEATHER: **Overcast** TEMP: **80° F**

DEPTH TO ROCK: ---

*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Sara Jansyn**

DRILLER: **Rick Posa**

SURFACE ELEVATION: **80.0**

DATUM: **See Remarks**

DATE START: **7/18/05**

DATE FINISH: **7/18/05**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5

PLASTIC LIMIT % × — WATER CONTENT % ⊗ — LIQUID LIMIT % △ 10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1–19								See boring log B-4 for subsurface data to 20'		75.0 / 70.0 / 65.0
20										60.0
21–24	6 5 6 6		C-1	8/48	13			8" Rd-bwn Sandstone pieces, metal debris		
25	2									55.0

REMARKS: Surface elevation estimated based on site survey drawing prepared by Tectonic.

BORING LOG 2833-00.GPJ TECTONIC ENG.GDT 8/21/09

TECTONIC *ENGINEERING & SURVEYING CONSULTANTS P.C.*

PROJECT No. **2833.00**

PROJECT: **So. Maple Street Bridge Rehabilitation**

LOCATION: **Enfield, CT**

BORING No. B-3A

SHEET No. 2 of 2

CLIENT: **Town of Enfield**

CONTRACTOR: **General Borings, Inc.**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ◓ — 1 2 3 4 5

PLASTIC LIMIT % × — WATER CONTENT % ⊗ — LIQUID LIMIT % △ — 10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.) ● — 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	2							Rd-bwn fresh, slightly fractured, medium grained, moderately hard, SANDSTONE; fractures generally horizontal to 20 degrees from horizontal		
27	3		C-2	58/60	66					
28	3									
29	3									
30	3		C-3	0/12	0			No Recovery		50.0
								End of Boring at 30'		
35										45.0
40										40.0
45										35.0
50										30.0
55										25.0

REMARKS: Surface elevation estimated based on site survey drawing prepared by Tectonic.

BORING LOG 2833-00.GPJ TECTONIC ENG.GDT 8/21/09

TECTONIC *ENGINEERING & SURVEYING CONSULTANTS P.C.*

PROJECT No. **2833.00**

PROJECT: **So. Maple Street Bridge Rehabilitation**

LOCATION: **Enfield, CT**

BORING No. B-4

SHEET No. 1 of 2

CLIENT: **Town of Enfield**

CONTRACTOR: **General Borings, Inc.**

METHOD OF ADVANCING BORING	DIA.	DEPTH
POWER AUGER:	3 1/4"	0 TO 20'
ROT. DRILL:		TO
CASING:		TO
DIAMOND CORE:	2"	20 TO 30'

RIG/HAMMER TYPE: Case/winch-safety

GROUND WATER	DATE	TIME	DEPTH
	7/19/05	2:00 pm	6.1'

MON. WELL ☐ YES ☒ NO

SCREEN DEPTH: --- TO ---

WEATHER: **Overcast** TEMP: **80° F**

DEPTH TO ROCK: **14'**

*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Sara Jansyn**

DRILLER: **Rick Posa**

SURFACE ELEVATION: **80.0**

DATUM: **See Remarks**

DATE START: **7/19/05**

DATE FINISH: **7/19/05**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5

PLASTIC LIMIT % × — WATER CONTENT % ⊗ — LIQUID LIMIT % △ 10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1								Augered through asphalt concrete pavement		
2	23	10 13 10 4	S-1	15		M	SP-SM	Bwn c-f SAND, little f Gravel, trace Silt (FILL)		
4	9	6 5 4 4	S-2	12		M	SP	Tn m-f SAND, trace Silt (FILL)		75.0
6	6	5 4 2 5	S-3	6		M	SP	Tn m-f SAND, little f Gravel, trace Silt (FILL) ▼		
10										70.0
11	5	2 2 3 5	S-4	4		M	SP	Same (FILL)		
15	100+	100/4	S-5	4		D	SM	Rd-bwn c-f SAND, and c-f Gravel, little Silt (broken bedrock)		65.0
20										60.0
21	5 5 5 4 5		C-1	57/60	73			Rd-bwn fresh slightly fractured, medium grained, moderately hard, SANDSTONE, fractures approximately horizontal		
25										55.0

REMARKS: Surface elevation estimated based on site survey drawing prepared by Tectonic. Groundwater level influenced by introduction of water from coring.

BORING LOG 2833-00.GPJ TECTONIC ENG.GDT 8/21/09

TECTONIC *ENGINEERING & SURVEYING CONSULTANTS P.C.*

PROJECT No. **2833.00**

PROJECT: **So. Maple Street Bridge Rehabilitation**

LOCATION: **Enfield, CT**

BORING No. B-4

SHEET No. 2 of 2

CLIENT: **Town of Enfield**

CONTRACTOR: **General Borings, Inc.**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	4									
27	5							Same, slightly to moderately fractured, oriented 0 - 20 degrees from horizontal, some Silt filling		
28	5		C-2	55/60	57					
29	4									
30	5									50.0
31								End of Boring at 30'		
32										
33										
34										
35										45.0
36										
37										
38										
39										
40										40.0
41										
42										
43										
44										
45										35.0
46										
47										
48										
49										
50										30.0
51										
52										
53										
54										
55										25.0

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ◓ — 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % — × ⊗ △ — 10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.) ● — 10 20 30 40 50

REMARKS: Surface elevation estimated based on site survey drawing prepared by Tectonic. Groundwater level influenced by introduction of water from coring.

BORING LOG 2833-00.GPJ TECTONIC ENG.GDT 8/21/09

TECTONIC *ENGINEERING & SURVEYING CONSULTANTS P.C.*

PROJECT No. **2833.00**

PROJECT: **So. Maple Street Bridge Rehabilitation**

LOCATION: **Enfield, CT**

BORING No. B-5

SHEET No. 1 of 2

CLIENT: **Town of Enfield**

CONTRACTOR: **General Borings, Inc.**

METHOD OF ADVANCING BORING	DIA.	DEPTH
POWER AUGER:	3 1/4"	0 TO 20'
ROT. DRILL:		TO
CASING:		TO
DIAMOND CORE:	2"	20 TO 30'

RIG/HAMMER TYPE: Case/winch-safety

GROUND WATER	DATE	TIME	DEPTH
	7/20/05	8:30 am	10.11'

MON. WELL ☐ YES ☒ NO

SCREEN DEPTH: --- TO ---

WEATHER: **Clear** TEMP: **90° F**

DEPTH TO ROCK: **14'**

*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Sara Jansyn**

DRILLER: **Rick Posa**

SURFACE ELEVATION: **78.0**

DATUM: **See Remarks**

DATE START: **7/19/05**

DATE FINISH: **7/19/05**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ⊖ — 1 2 3 4 5

PLASTIC LIMIT % ⊗ WATER CONTENT % △ LIQUID LIMIT % — 10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.) ● — 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1–2	19	1 8 11 12	S-1	6		M	SM	Bwn c-f SAND, some Silt, little f Gravel (FILL)		
3–4	17	7 8 9 6	S-2	6		M	SP-SM	Bwn c-f SAND, some f Gravel, trace Silt (FILL)		
5–6	9	5 5 4 4	S-3	2		M	SM	Bwn c-f SAND, some Silt, little f Gravel		73.0
7–10										
11–12	40	21 25 15 11	S-4	8		M	SM	Rd-bwn c-f SAND, some c-f Gravel, little Silt		68.0
13–15										
15	50+	50/2	S-5	2		M	SM	Rd-bwn c-f SAND, some Silt (broken bedrock)		63.0
16–20										58.0
21–25	3 2 2 2 2		C-1	55/60	35			Rd-bwn, slightly to moderately weathered, moderately fractured, medium grained, moderately hard, SANDSTONE; fractures approximately horizontal, some Silt filled		53.0

REMARKS: Surface elevation estimated based on site survey drawing prepared by Tectonic. groundwater level influenced by introduction of water during coring.

BORING LOG 2833-00.GPJ TECTONIC ENG.GDT 8/21/09

TECTONIC *ENGINEERING & SURVEYING CONSULTANTS P.C.*

PROJECT No. **2833.00**

PROJECT: **So. Maple Street Bridge Rehabilitation**

LOCATION: **Enfield, CT**

BORING No. B-5

SHEET No. 2 of 2

CLIENT: **Town of Enfield**

CONTRACTOR: **General Borings, Inc.**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ◓ — 1 2 3 4 5

PLASTIC LIMIT % × — WATER CONTENT % ⊗ — LIQUID LIMIT % △ — 10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.) ● — 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	3									
27	4									
28	4		C-2	60/60	55			Same, few Silt filled		
29	4									
30	3									48.0
								End of Boring at 30'		
31										
32										
33										
34										
35										43.0
36										
37										
38										
39										
40										38.0
41										
42										
43										
44										
45										33.0
46										
47										
48										
49										
50										28.0
51										
52										
53										
54										
55										23.0

REMARKS: Surface elevation estimated based on site survey drawing prepared by Tectonic. groundwater level influenced by introduction of water during coring.

BORING LOG 2833-00.GPJ TECTONIC ENG.GDT 8/21/09

TECTONIC *ENGINEERING & SURVEYING CONSULTANTS P.C.*

PROJECT No. **2833.00**

PROJECT: **So. Maple Street Bridge Rehabilitation**

LOCATION: **Enfield, CT**

BORING No. B-6

SHEET No. 1 of 1

CLIENT: **Town of Enfield**

CONTRACTOR: **General Borings, Inc.**

METHOD OF ADVANCING BORING	DIA.	DEPTH
POWER AUGER:	3 1/4"	0 TO 9'
ROT. DRILL:		TO
CASING:	3"	0 TO 10'
DIAMOND CORE:	2"	10 TO 25'

RIG/HAMMER TYPE: Case/winch-safety

GROUND WATER	DATE	TIME	DEPTH
	7/20/05	12:00 pm	11.6'

MON. WELL ☐ YES ☒ NO

SCREEN DEPTH: --- TO ---

WEATHER: **Clear** TEMP: **80° F**

DEPTH TO ROCK: **9'**

*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Sara Jansyn**

DRILLER: **Rick Posa**

SURFACE ELEVATION: **78.0**

DATUM: **See Remarks**

DATE START: **7/20/05**

DATE FINISH: **7/20/05**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ⊖ 1 2 3 4 5

PLASTIC LIMIT % ⊗ WATER CONTENT % △ LIQUID LIMIT %

10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	9	3 4 5 8	S-1	6		M	SM	Bwn c-f SAND, little f Gravel, little Silt		
3	23	8 11 12 13	S-2	8		M	GM	Rd-bwn f GRAVEL, some c-f Sand, little Silt		
5	41	12 18 23 29	S-3	6			SP	Rd-bwn c-f SAND, and c-f Gravel, trace Silt		73.0
11	5 3 2 3 3		C-1	60/60	66			Rd-bwn, slightly weathered, moderately to slightly fractured, medium grained, moderately hard, SANDSTONE; fractures generally horizontal to 20 degrees from horizontal, mostly filled with Silt		68.0
16	2 3 2 3 3		C-2	59/60	63			Same, one fracture 50 degrees from horizontal @ 18.5', moderately to highly fractured zone from 19'-20.5'		63.0
21	2 3 4 2 3		C-3	58/60	62			Same, no Silt filled fractures		58.0
25								End of Boring at 25'		53.0

REMARKS: Surface elevation estimated based on site survey drawing prepared by Tectonic. Groundwater levels influenced by introduction of water during coring.

BORING LOG 2833-00.GPJ TECTONIC ENG.GDT 8/21/09

TECTONIC *ENGINEERING & SURVEYING CONSULTANTS P.C.*

PROJECT No. **2833.00**

PROJECT: **So. Maple Street Bridge Rehabilitation**

LOCATION: **Enfield, CT**

BORING No. B-7

SHEET No. 1 of 1

CLIENT: **Town of Enfield**

CONTRACTOR: **General Borings, Inc.**

METHOD OF ADVANCING BORING	DIA.	DEPTH
POWER AUGER:	3 1/4"	0 TO 7'
ROT. DRILL:		TO
CASING:		TO
DIAMOND CORE:		TO

RIG/HAMMER TYPE: Case/winch-safety

GROUND WATER	DATE	TIME	DEPTH
	7/20/05	2:15 pm	NE

MON. WELL ☐ YES ☒ NO

SCREEN DEPTH: --- TO ---

WEATHER: **Clear** TEMP: **85° F**

DEPTH TO ROCK: **7'**

*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Sara Jansyn**

DRILLER: **Rick Posa**

SURFACE ELEVATION: **82.0**

DATUM: **See Remarks**

DATE START: **7/20/05**

DATE FINISH: **7/20/05**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5

PLASTIC LIMIT % ⊗ WATER CONTENT % △ LIQUID LIMIT % 10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	16	10 9 7 7	S-1	18		M	SM	4" Asphalt Concrete Pavement, 6" Subbase Tn m-f SAND, little Silt (FILL)		
2										
3										
4	14	5 5 9 14	S-2	8		M	SM	Bwn c-f SAND, some Silt, little f Gravel		
5	100+	100/1	S-3	1		D	GP	Gy f GRAVEL		77.0
6										
7	50+	50/1	S-4	1		D	SP	Rd-bwn SAND, little f Gravel, trace Silt (broken Sandstone) Auger Refusal @ 7.1' End of Boring at 7.1'		
8										
9										
10										72.0
11										
12										
13										
14										
15										67.0
16										
17										
18										
19										
20										62.0
21										
22										
23										
24										
25										57.0

REMARKS: Surface elevation estimated based on site survey drawing prepared by Tectonic.

BORING LOG 2833-00.GPJ TECTONIC ENG.GDT 8/21/09

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LEGEND FOR SOIL DESCRIPTION

COARSE GRAINED SOIL: (Coarser than No. 200 sieve)

DESCRIPTIVE TERM & GRAIN SIZE

TERM	SAND	GRAVEL
coarse - c	No. 4 Sieve to No. 10 Sieve	3" to 3/4"
medium - m	No. 10 Sieve to No. 40 Sieve	
fine - f	No. 40 Sieve to No. 200 Sieve	3/4" to 3/16"

COBBLES 3" to 10" **BOULDERS** 10" +

GRADATION DESIGNATIONS	PROPORTIONS OF COMPONENT
fine, f	Less than 10% coarse to medium
medium to fine, m-f	Less than 10% coarse
medium, m	Less than 10% coarse and fine
coarse to medium, c-m	less than 10% fine
coarse, c	Less than 10% medium and fine
coarse to fine, c-f	All greater than 10%

FINE GRAINED SOIL: (Finer than No. 200 Sieve)

DESCRIPTION	PLASTICITY INDEX	PLASTICITY
Silt	0 - 1	none
Clayey Silt	2 - 5	slight
Silt & Clay	6 - 10	low
Clay & Silt	11 - 20	medium
Silty Clay	21 - 40	high
Clay	greater than 40	very high

PROPORTION:

DESCRIPTIVE TERM	PERCENT OF SAMPLE WEIGHT
trace	1 - 10
little	10 - 20
some	20 - 35
and	35 - 50

The primary component is fully capitalized

COLOR:

Blue - blue	Gy - gray	Wh - white
Blk - black	Or - orange	Yl - yellow
Bwn - brown	Rd - red	Lgt - light
Gn - green	Tn - tan	Dk - dark

SAMPLE NOTATION:

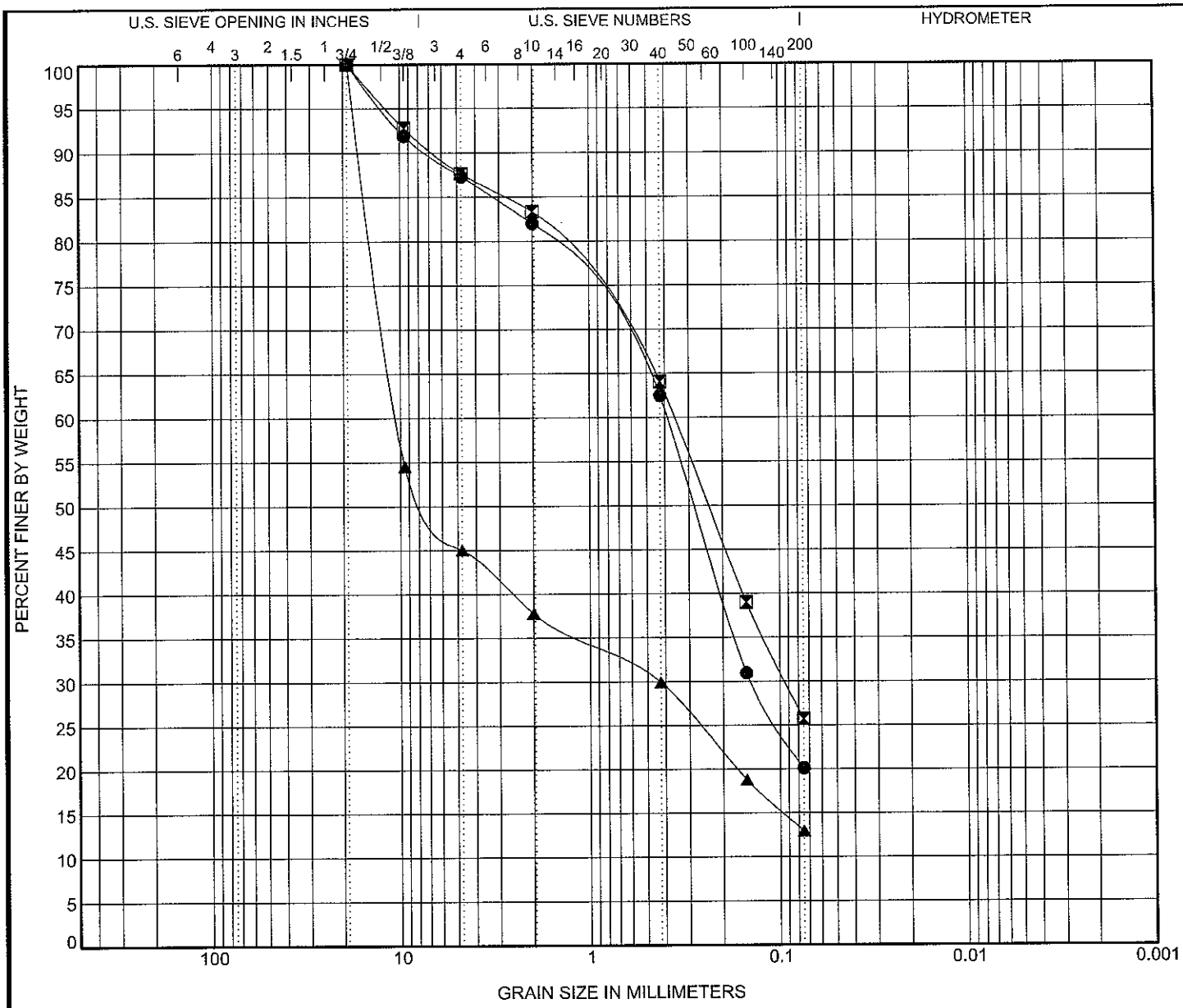
S - Split Spoon Soil Sample
U - Undisturbed Tube Sample
C - Core Sample
B - Bulk Soil Sample
NR - No Recovery of Sample

WOC - Weight of Casing
WOR - Weight of Rods
WOH - Weight of Hammer
PPR - Compressive Strength based on Pocket Pentrometer
TV - Shear Strength (tsf) based on Torvane

ADDITIONAL CLASSIFICATIONS:

New York City Building Code soil classifications are given in parentheses at the end of each description of material, if applicable. See Sections 1804.2 of the 2008 Building Code for further details.

APPENDIX II



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Identification			Classification	WC%	LL	PL	PI	Cc	Cu
●	B-2	2.0	S-2	Rd Bwn c-f SAND, some Silt, little f Gravel	19.5					
⊠	B-5	4.0	S-3	Bwn c-f SAND, some Silt, little f Gravel	8.7					
▲	B-6	2.0	S-2	Rd Bwn f GRAVEL, some c-f Sand, little Silt	6.1					

	Sample Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	Source of Material
●	B-2	2.0	S-2	19	0.391	0.141		12.7	67.2	20.1		Boring
⊠	B-5	4.0	S-3	19	0.359	0.094		12.3	61.9	25.7		Boring
▲	B-6	2.0	S-2	19	10.329	0.432		55.0	32.1	13.0		Boring

TECTONIC *ENGINEERING & SURVEYING CONSULTANTS P.C.*
2570 Route 9w
New York, 12518
Telephone: 845-534-3450 Fax: 845-534-5109

GRAIN SIZE DISTRIBUTION

Project No: **2833.00** Date: **8/21/09**
Project: **So. Maple Street Bridge Rehabilitation**
Location: **Enfield, CT**

GRAIN SIZE DISTRIBUTION 2833-00.GPJ TECTONIC ENG.GDT 8/21/09

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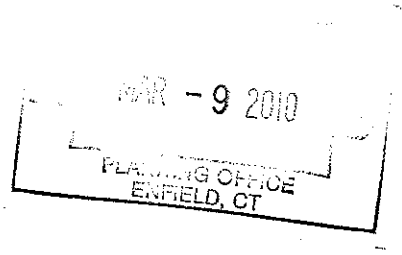
XIW-10-02

Appendix I – Water Handling and Temporary Hydraulic Facilities Design

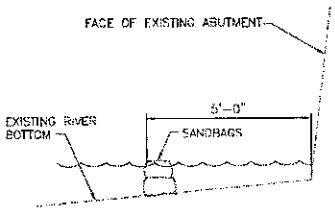


Temporary Conditions:

In order to determine the elevation for the temporary facilities to control the water during construction activities, the existing HEC-RAS model was modified by moving the bridge abutments closer together

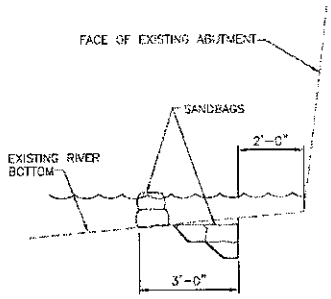
Stage Construction:

Stage construction for this project consists of a single phase. South Maple Street will be closed for the duration of the project.



STEP 2

The general plan is to install cofferdams surrounding each existing abutment leaving the center of the watercourse undisturbed and open. The cofferdams will be placed approximately 2 feet from the face of the abutments and extend upstream and downstream to envelop the work zones on each side. Base on the anticipated schedule the cofferdams will be installed after July 1st and before September 1st to permit construction to proceed.

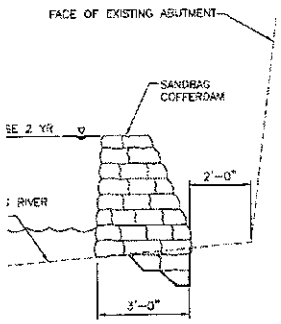


STEP 3

The proposed cofferdams shall isolate the work area utilizing stacked sand bags as indicated in the schematic drawings. Temporary Cofferdams shall be designed to prevent the 2 - yr storm from inundating the work site. The calculated water surface elevation using the cofferdam placement indicated is 66.06..

The basic Steps for installing the cofferdams are:

1. Install Turbidity curtains as needed,
2. Install the first row or bags to cut off the flows from the work site,
3. Hand excavate for the second and other rows as needed to toe in the cofferdam,
4. Hand place the remaining bags as needed to form the cofferdam,
5. Once the dams are completed the Contractor will be permitted to pump out the water and continue work.

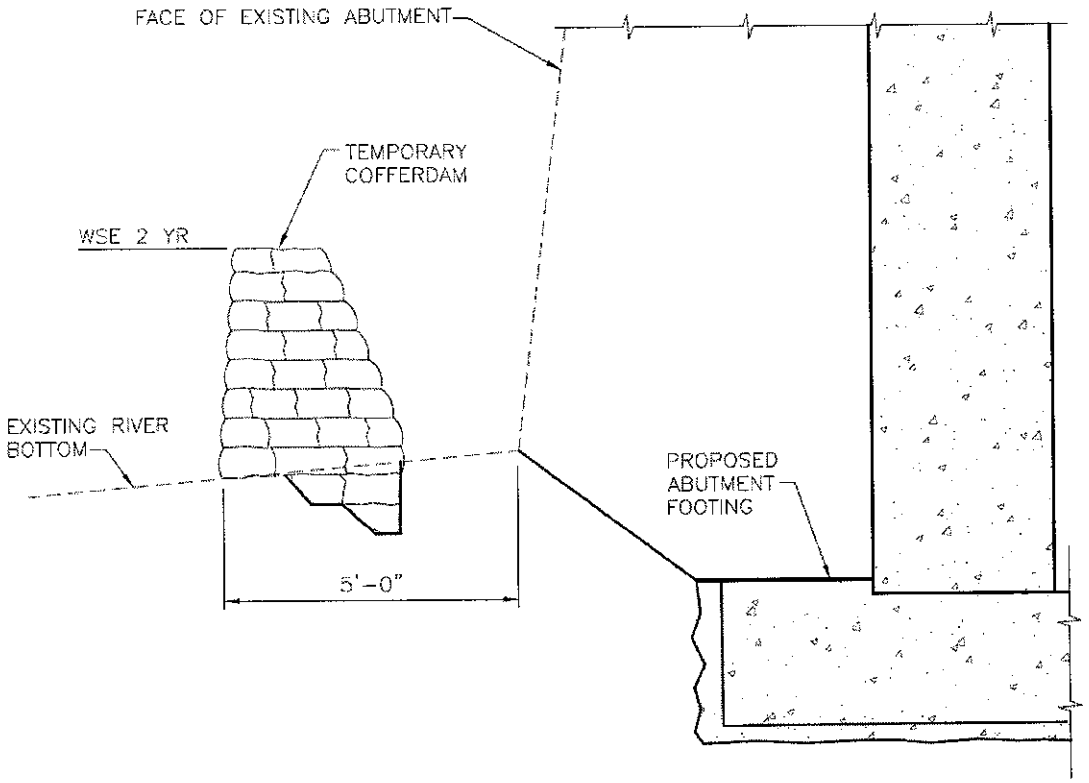


STEP 4

Water Handling and Temporary Facilities:

The contractor will pump out any water, once the cofferdams are installed and properly sealed. This will permit work to proceed in the dry. The pumped water shall be discharged into temporary detention structure(s). The temporary structures will be located on or near the existing road, likely on both sides of the River. The basins shall be sized by the contractor to settle out sediments then discharge the water into the River via protected channels. The temporary facilities will be sized in accordance with the current stormwater quality manual.

The temporary facilities to treat the pumped water will be located above the 500-yr flood elevation. The cofferdams will be designed to overtop for any flows in excess of the 2-yr storm without the structure washing away.



COFFERDAM

N.T.S.

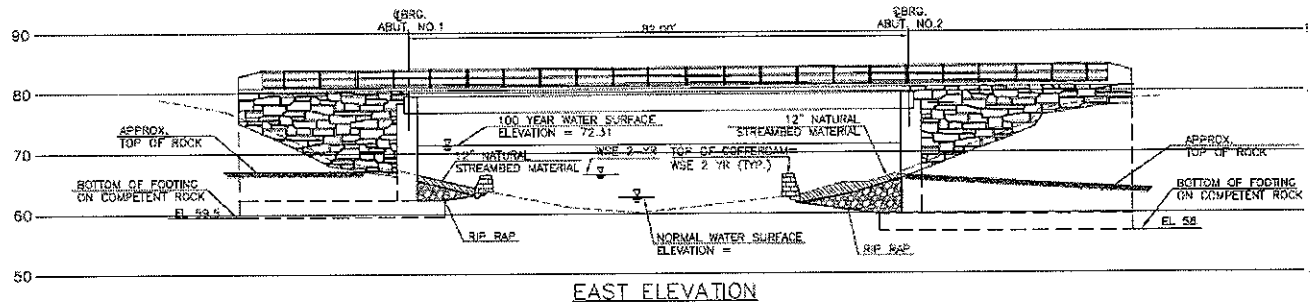
Flood Contingencies:

The Contract is required to adhere to the CTDOT standard for equipment storage and clearance of the site for impending floods. In addition, no equipment, tool and materials will be stored within the floodplain.

The following table summarized the minimum design requirements for the temporary facilities.

Average Daily Flow	119.73 cfs
Average Spring Flow	231.78 cfs
Temporary Design Discharge	1,050 cfs
Temporary Design Frequency	2 Year
Temporary Water Surface Elevation Upstream	66.06 ft
Temporary Water Surface Elevation Downstream	64.15 ft

Figure 1: Temporary Structure Requirements



EAST ELEVATION

XIW-10-02

FINAL SCOUR REPORT
FOR SOUTH MAPLE STREET BRIDGE
OVER SCANTIC RIVER
(Bridge No. 03972)

Enfield, Connecticut

PREPARED BY: Tectonic Engineering & Surveying Consultants PC
March, 8, 2010

Prepared By: Jeffrey A. Scala, P.E Date: _____

Checked By: Manish Gupta, P.E. Date: _____

_____

Manish Gupta, P.E.
ConnDOT Approved Hydraulic Engineer

REVISIONS		
	DATE	ENGINEER
☐		
☐		

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ENFIELD, CT

Table of Contents

EXECUTIVE SUMMARY

Purpose:

The purpose of this project is to replace the existing South Maple Street Bridge over the Scantic River in the Town of Enfield. The existing bridge is in very poor shape, has been load restricted to only 8 tons and is only one lane. The approach roadway is comprised of two lanes with narrow shoulders.

Summary and Conclusions

The scour potential of the proposed structure is very minor. As proposed the new structure will be founded on bedrock with a significantly wider waterway opening that better matched the upstream bank full width. The proposed footing will be reinforced concrete spread footing set into competent bedrock.

An evaluation of the scour potential and stream stability at the subject location has been performed. The existing structure constructed in 1925 has been subject to a number of significant large events including the major floods of November 1927, September 1938, August 1955, and June 1984 without reported damage.

The existing bridge has been periodically inspected in accordance with NBIS requirements by the Connecticut Department for Transportation since program implementation. No evidence of scour has been noted. Tectonic has reviewed the reports from 2006 and 2008 and performed our own site review and geotechnical investigation. No evidence of scour has been noted.

The existing southern abutment is supported on a spread footing founded on bedrock, which is visible in the field. The existing northern abutment is also supported on a spread footing founded on bedrock, which is noted in the Bridge Inspection Reports.

The riverbed upstream of the bridge consists primarily of exposed ledge. Ledge was also observed at the downstream face of the bridge. Downstream of the bridge is a large pool area that transitions to a wider floodplain. Noted in the field was a deposition of alluvial material that has formed an island in the center of the channel. Active bank erosion several hundred feet downstream of the bridge was noted by the undercutting of the bank and overhanging roots.

	Existing Bridge	**Proposed Bridge**
NBIS 113 Rating Recommendation (Scour Critical Bridges)	Non critical structure - 8	Non critical structure - 8
NBIS 71 Rating Recommendation (Waterway Adequacy)	8	9
NBIS 61 Rating Recommendation (Channel and Channel Protection)	6	6

	Existing Bridge	Proposed Bridge
Scour Risk Designation	Low Risk	Low Risk
Maximum Depth of Scour Potential	None	None
Foundation Type	Known - Spread footings on Bedrock	Known - Spread footings into competent Bedrock
Recommendation(s)	Bridge is being replaced	Design Foundation set into the bedrock.

Figure 1: Bridge Summary

Drainage Area	69.7 sq. mile
Design Frequency year	100 year
Design Discharge	4715 cfs
Average Daily Flow Depth / Volume	1-1.5 ft - Estimated / 119.73 cfs
Upstream Design Water Surface Elevation	69.52 ft
Downstream Design Water Surface Elevation	67.69 ft
Maximum Scour Depth	0 ft
Frequency year	500 yr
Discharge	6430 cfs
Worst case scour sub-structure unit	Not Applicable

Figure 2: Summary Table

Notes:

1. Isolated areas of active scour of the banks were evident in the downstream reach. Extensive vegetative growth on the banks was noted with isolated areas of overhanging roots.
2. The streambed upstream has extensive exposed ledge. The side slopes were steep with signs of very minor embankment erosion.
3. The review of the previous bridge inspection reports and field observation does not indicate any scour issues at the bridge.

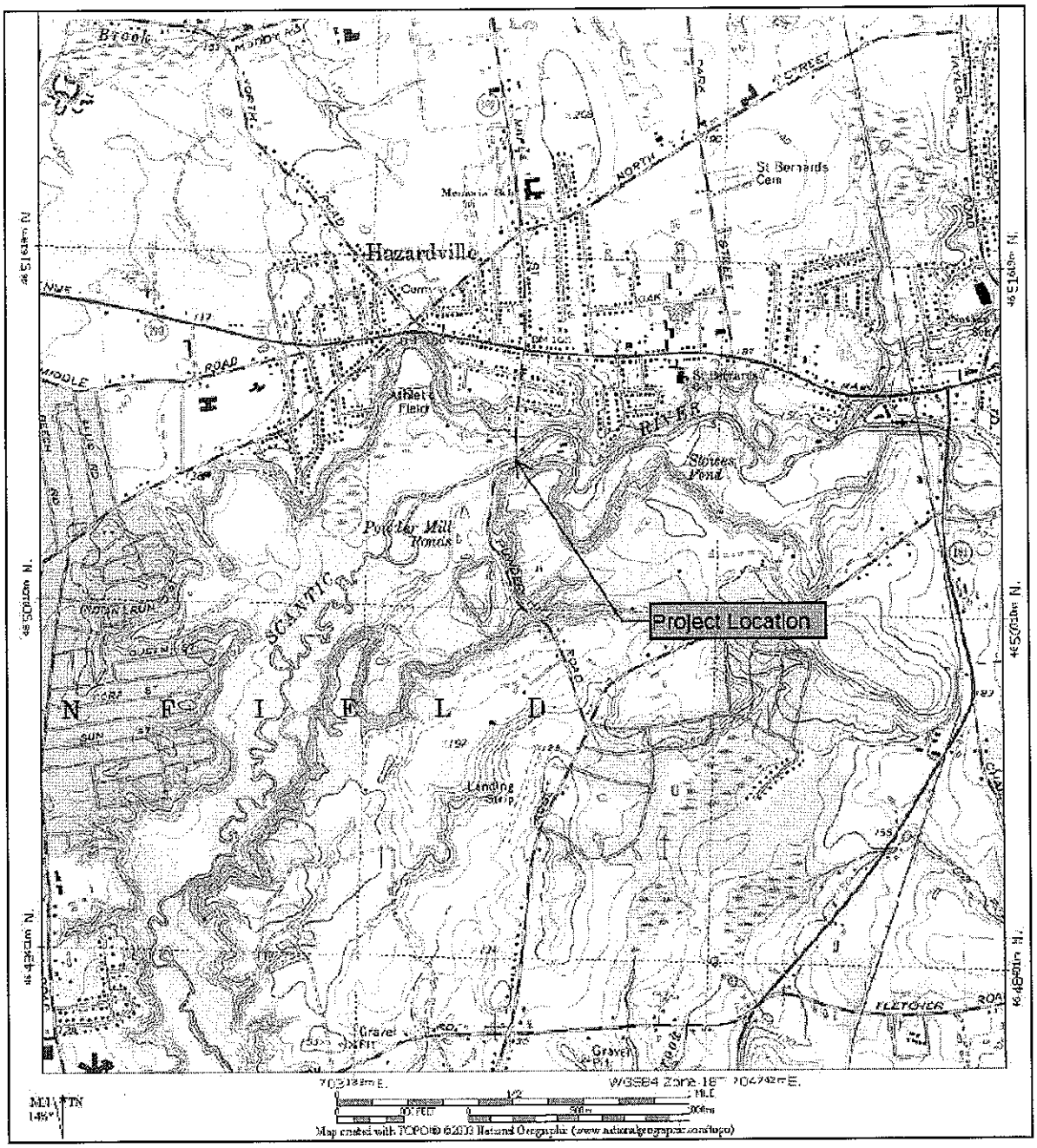

Figure 3: Location Map

Background / Site Conditions

The South Maple Street Bridge (Bridge No. 03972) over the Scantic River is located 1750 ft south of State Route 190 (Hazard Avenue). The existing 70-foot-long, 15-foot-wide structure has a single 63-foot-long span between abutments, with a four-panel through steel Warren truss superstructure. Each of the two main trusses has a box girder top chord and paired angle lower members, all originally with riveted

connections which have been replaced with bolts. The floor system of rolled I-beams includes three floor beams carrying six stringers.

The deck, with an upper surface about 15 feet above the Scantic River, consists of a bituminous concrete wearing surface over a reinforced concrete deck, spanning 2.5 feet between the stringers. The deck has a 1.5-foot-high concrete parapet on either side topped with galvanized steel guardrails attached with vertical W-shape members.

The abutments and U-type wingwalls are gravity type, constructed of reinforced concrete (c1956) and stone masonry (c1925) and founded on bedrock. The southern abutment is penetrated by two 5-foot diameter pipe culverts, and both abutments have smaller pipe culverts, to pass high river flows.

The bridge was built in 1925, repaired in 1931, repaired again with abutment reconstruction in 1956, heavily reconstructed in 1978-79, and repaired in 2003 with additional bolts. The repairs begun in 1978 greatly altered the superstructure, and included welded-on reinforcement of most major members, the addition of sway braces on outriggers, elimination of the lower chord in the end panels, and anchor blocks welded onto the truss ends to support steel rods which function as the lower chords.

North of the bridge, South Maple Street rises gradually towards Hazard Avenue with a paved width of approximately 25 feet, and passes the intersection of Dust House Road which meets South Maple Street from the west about 270 feet from the bridge. North of Dust House Road, South Maple Street traverses a steeper late glacial stream terrace.

The proposed bridge replacement project will include removal of the existing bridge and most or all of its abutments, construction of a new 45-foot-wide bridge with a single 82-foot span and concrete abutment, and reconstruction of existing bridge approaches to a point about 40 feet north of Dust House Road to the north and to a point about 100 feet from the south end of the new bridge. There will be virtually no change in existing grade south of the river. North of the river, the grade will rise from 0-1.8 feet from north to south.

The project is being constructed with Federal (earmark) funding.

HYDROLOGY

The drainage area discharges point was selected at coordinate 42°58'55"N, 72°32'24"W, which is at the subject bridge.

The watershed area for this site was delineated and measured from U.S.G.S. StreamStats Version 2 online interactive tools and verified using available mapping.

The associated drainage area (69.7 square miles) is lightly developed with residential, commercial and individual properties. Predominately the basin is characterized by pervious land uses and cover consisting of second growth forest and agricultural farmland.

StreamStats also provided the computed peak discharges at the design point. StreamStat uses the USGS Regression Equations to calcutate the flows. The USGS Regression Equations are appropriate for use at this site as the drainage area is greater than 1 mi^2 and the quantity of storage is less than 4 ½ million ft^3/mi^2.

To calibrate the flow rates developed from StreamStats a comparison was performed using the Hockanum River gauge location in East Hartford (gauge 01192500). For the design the the 100-year event with a calculated flow rate of 4,715 cfs has been used. Additional details on the methodology and computation are included in the appendix.

2-yr (cfs)	10-yr (cfs)	25-yr (cfs)	50-yr (cfs)	100-yr (cfs)	500-yr (cfs)
1050	2380	3205	3895	4715	6430

Figure 4: Summary of Discharges

The recommended flow rate for design purposes is **4,715** CFS for the 100-year storm. Based on the sites hydraulic sensitivity and configuration it is recommended that the 500-year storm flow rate of **6,430** CFS also be used as a check for the hydraulic capacity.

HYDRAULIC S

Analysis Criteria Used:

1. The recommended flow rate for design purposes is the 100-year event
2. The starting tail water elevation utilized is 68.25 ft. This is based on the 100-yr storm event.
3. Manning's values are based on field visits, associated photographs, and survey information. The values utilized are within widely recognized ranges and are similar to values utilized in various FEMA studies in other watercourses in the area.
4. Hydraulic cross sections were obtained from field survey and supplemented with available mapping.
5. The controlling headwater elevation was selected based on the CTDOT Drainage Manual requirements. We specifically reviewed adjacent properties, roads and bridge low cord elevations. For this project the low cord elevation is most appropriate.
6. CTDEP Hydraulic Analysis Guidance Document (DEP-IWRD-GUIDE-001) (dated 01/2605)
7. CTDOT Drainage Manual (updates through November 2009)

8. The analysis was performed utilizing "HEC-RAS Version 4.0.0 as Distributed by U.S. Army Corps of Engineers"

Natural Conditions:

In order to determine backwater effects of the existing bridge and the difference in backwater for proposed conditions, an analysis of the natural condition was performed. This condition consists of removing the bridge structure and embankments from the model. Historically this area was an active mill site that highly modified the waterway. Slopes on the channel sides were matched to the upstream and downstream conditions. All other input data remained the same as the Existing Conditions Model.

Existing Conditions

This model represents the current conditions.

The existing hydraulic condition analysis was developed utilizing topographic field survey in conjunction with topographic mapping provided by Town of Enfield and field reviews.

The South Maple Street Bridge over the Scantic River is located 1750 ft south of State Route 190 (Hazard Avenue). The existing 70-foot-long, 15-foot-wide structure has a single 63-foot-long span between vertical abutments, with a through truss superstructure. Each of the two main trusses has a box girder top chord and paired angle lower members. The deck, with an upper surface about 15 feet above the Scantic River, consists of a bituminous concrete wearing surface over a reinforced concrete deck. The deck has a 1.5-foot-high concrete parapet on both sides topped with galvanized steel guide rails.

The abutments and U-type wingwalls are gravity type, constructed of reinforced concrete (c1956) and stone masonry (c1925) and founded on bedrock.

The stream channel is approximately 85-95 feet wide with moderately steep side slopes that extend nearly to the road elevation. The bottom is lined with natural materials consisting of sand, stones, cobbles and small boulders. Upstream of the bridge the bottom has extensive areas of exposed bedrock. The stream bed appears stable. The side slope are moderately well vegetated and appear generally stable. The vegetation consists of underbrush and deciduous trees up to 6 inches in average diameter. Several very large trees in excess of 20" were noted.

The thalweg upstream of the bridge is steep with a slope of approximately 2.51 percent. The slope in the immediate vicinity of the bridge is approximately 0 percent. The thalweg downstream of the bridge is flat with a slope of approximately 0.236 percent.

There are no other controlling structures either downstream or upstream of the subject bridge.

Proposed Design Analysis:

The proposed structure is a single span bridge using adjacent precast box beams on concrete abutments. The new bridge will have a clear span of 78.84 ft measured from abutment to abutment. The bridge will carry bidirectional traffic and have shoulders and sidewalks on both sides to

accommodate pedestrians and bicycles. The footings will be concrete spread footings set into competent rock. Work within the channel will be limited to temporary impacts necessary to construct the new bridge.

The design selected considers the maximum backwater allowed by the National Flood Insurance Program. The design meets all of the requirements. The proposed 100-yr headwater does not exceed the "no more than 1 foot over natural condition criteria".

The design does not alter the flow distribution in the downstream floodplain.

A required vertical clearance has been met and allows for passage of ice and debris. In addition, the waterway opening meets the ACOE waterway requirements.

The project will not adversely affect the rivers morphology nor cause degradation or aggregation of the river.

The existing channel and proposed bridge are hydraulically adequate for the existing flow rates. The calculated water surface elevations for the 100-yr and 500-yr storms remain completely within the channel.

The following tables and graphs summarize the results of the analysis.

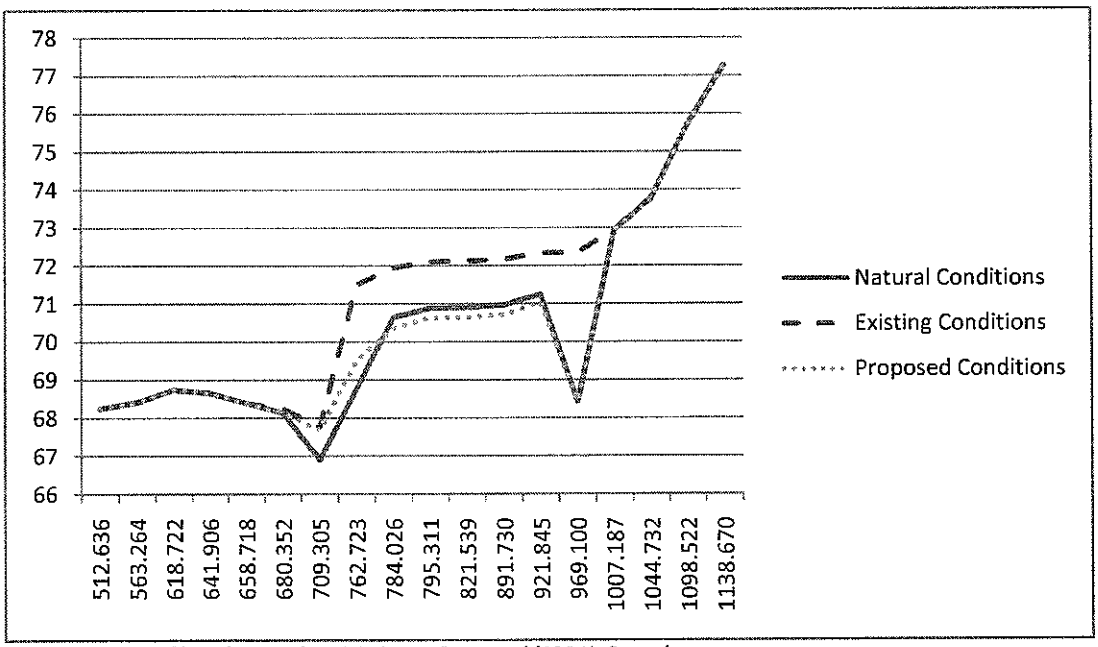

Figure 5: WSE Profiles of Natural vs Existing vs Proposed (100-Yr Storm)

Stations	Natural Conditions	Existing Conditions	Proposed Conditions	Δ water surface elevation (Between proposed and existing)	Δ water surface elevation (Between proposed and natural)
1138.67	77.27	77.27	77.27	0	0
1098.522	75.7	75.7	75.7	0	0
1044.732	73.76	73.77	73.76	-0.01	0
1007.187	72.93	72.94	72.93	-0.01	0
969.1	68.44	72.35	68.44	-3.91	0
921.845	71.25	72.34	71.03	-1.31	-0.22
891.73	70.97	72.17	70.72	-1.45	-0.25
821.539	70.91	72.14	70.65	-1.49	-0.26
795.311	70.89	72.11	70.64	-1.47	-0.25
784.026	70.65	71.96	70.36	-1.6	-0.29
762.723	68.78	71.5	69.52	-1.98	0.74
709.305	66.91	67.77	67.69	-0.08	0.78
680.352	68.14	68.25	68.14	-0.11	0
658.718	68.39	68.39	68.39	0	0
641.906	68.66	68.66	68.66	0	0
618.722	68.75	68.75	68.75	0	0
563.264	68.42	68.42	68.42	0	0
512.636	68.25	68.25	68.25	0	0

Figure 6: WSE Profile Data Table (100-yr)

Average Daily Flow	119.73 cfs
Average Spring Flow	231.78 cfs
Temporary Design Discharge	1,050 cfs
Temporary Design Frequency	2 Year
Temporary Water Surface Elevation Upstream	66.06 ft
Temporary Water Surface Elevation Downstream	64.15 ft

Figure 7: Temporary Structure Requirements

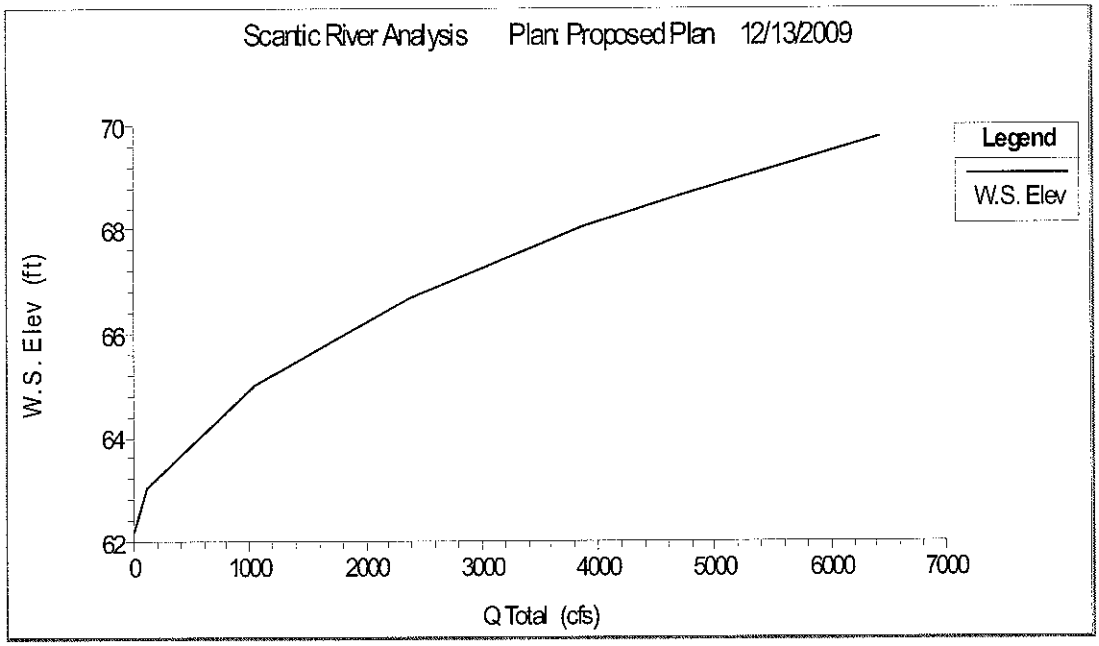

Figure 8: Rating Curve at Upstream Face of Proposed Bridge (flow versus depth)

SCOUR RESULTS

Scouring of bridge foundations during flood events is the most common cause of damage to and failure of bridges. Consequently, the Federal Highway Administration (FHWA) has determined that every bridge over water should be evaluated to ascertain its potential for damage or failure resulting from scouring of its foundations.

Scour and stream stability issues pertinent to this structure were evaluated by a team consisting of hydrologic, hydraulic, geotechnical and structural engineers. The evaluation was carried out in the following steps.

The initial evaluation concentrated on the stream stability, geomorphic assessment and site history. The review included collection and analysis of data available from a variety of sources, including but not

limited to, CTDOT Bridge Safety, Hydraulics and Drainage and Map File Room files, the Flood Insurance Study (FIS), Town of Enfield, field reviews, survey, soil mapping, geotechnical investigations and USGS topographic mapping.

The Initial Evaluation was followed by the analysis of the hydrology and hydraulics at the location and geotechnical evaluation of the bedrock at the location.

The relative stability of the Scantic River at the South Maple Street Bridge was assessed according to the FHWA guidelines "Stream Stability at Highway Structure" (HEC-20) and the current CTDOT Drainage Manual. The assessment is based on site inspections conducted on May 2009 and December 2009. The geomorphic characteristics observed during the site inspection are summarized in Appendix H. The observed geomorphic factors within the project limits indicate the stream and embankments at the bridge to be stable. However, some erosion of the banks downstream of the structure is present.

No known scour problems at the site have been identified from the available historical data including the previous NBIS Bridge inspection reports from 2008 and 2006. The historical data available does not allow the establishment of the rate of trend of long-term bed elevation changes. Since the streambed in the immediate vicinity to the bridge is exposed ledge, long-term bed elevation changes would be limited to aggradations.

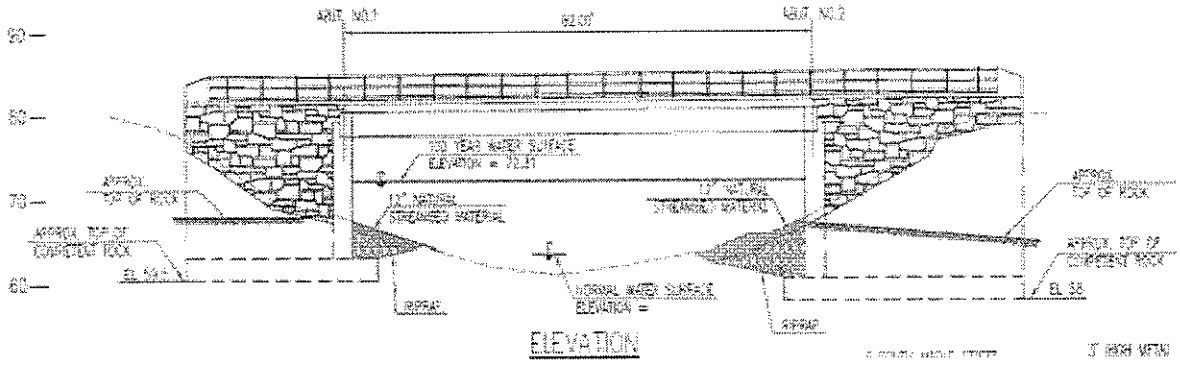

Figure 9: Proposed Bridge

SCOUR RECOMMENDATIONS:

The analysis of the bedrock shows that no scour is likely. Calculations were performed in accordance with Apppendix M of the HEC-18 (Evaluating Scour at Bridges, Fourth Edition, Publication No. FHWA NHI 01-001, May 2001). The Erodibility Index Method was used to determine the scour potential of the bedrock.

The Erodibility Index Method estimates the stream power required to cause erosion of bedrock based on erodibility characteristics of the bedrock. The stream power required to cause erosion is compared to the stream power anticipated during design high flow events (floods) to evaluate if those events may cause erosion of the bedrock.

The calculated value of the Erodibility Index (K) is 109 which correlates to a stream power of 56 KW/m^2. The maximum stream power for this site is 3.3 KW/m^2, therefore the existing materials are resistant to scour. Based on the results of our analyses, it is anticipated that foundations bearing into the bedrock will not be subject to scour under the 500-year flood event.

The scour potential of the proposed structure is very minor. As proposed the new structure will be founded on bedrock with a significantly wider waterway opening the will better match the upstream bank full width. The proposed footing will be reinforced concrete spread footing set into sound bedrock.

LISTING OF DIGITAL FILES INCLUDED

Hydrology Report – Preliminary
Hydraulic Report - Preliminary
HEC-RAS Files and Output
Drainage Area Map
FEMA Flood Map
Photos
Current Bridge Inspection Report
Data Collection and Field Review – Forms
Bridge Plans
Geotechnical Report

Figure 10: Digital Files

TECHNICAL APPENDIX

	Appendix
Hydrology Report – Preliminary	A
HEC-RAS Input and Output	B
Erodibility Index Calculations	C
HEC-RAS Cross Section Location Plan	E
Photos	F
Current Bridge Inspection Report	G
Data Collection and Field Review – Forms	H
Scour Field Evaluation Notes	I
Bridge Plans (11x17)	J
Geotechnical Report	K